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PROJECT CHECO SOUTHEAST ASIA REPORT

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PROJECT
Contemporary
Historical
Evaluation of
Combat
Operations
REPORT

OPERATION DELAWARE

19 April - 17 May 1968

2 SEPTEMBER 1968

HQ PACAF

Directorate, Tactical Evaluation
CHECO Division

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS PACIFIC AIR FORCES
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REPLY TO ATTN OF: DOTEC

2 September 1968

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Warren H. Peterson

WARREN H. PETERSON, Colonel, USAF
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AFAITC ..... 1 Cy
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388TFW ..... 1 Cy
432TRW ..... 1 Cy
460TRW ..... 1 Cy
483TAW ..... 1 Cy
553RECON WG ..... 1 Cy
6400 TEST SQ ..... 1 Cy
DOTEC ..... 6 Cys

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FOREWORD

This study outlines the air-assault of the 1st Cavalry Division and the 101st Airborne Division into the A Shau Valley and Route 547 during Operation DELAWARE (19 April-17 May 1968) in I Corps, South Vietnam. Emphasis is placed on the roles of tactical air, B-52 strikes, reconnaissance, and the airlift in support of Army ground troops. The suppression of enemy antiaircraft weapons and lines of communications is examined in the light of the air interdiction campaign in-country.

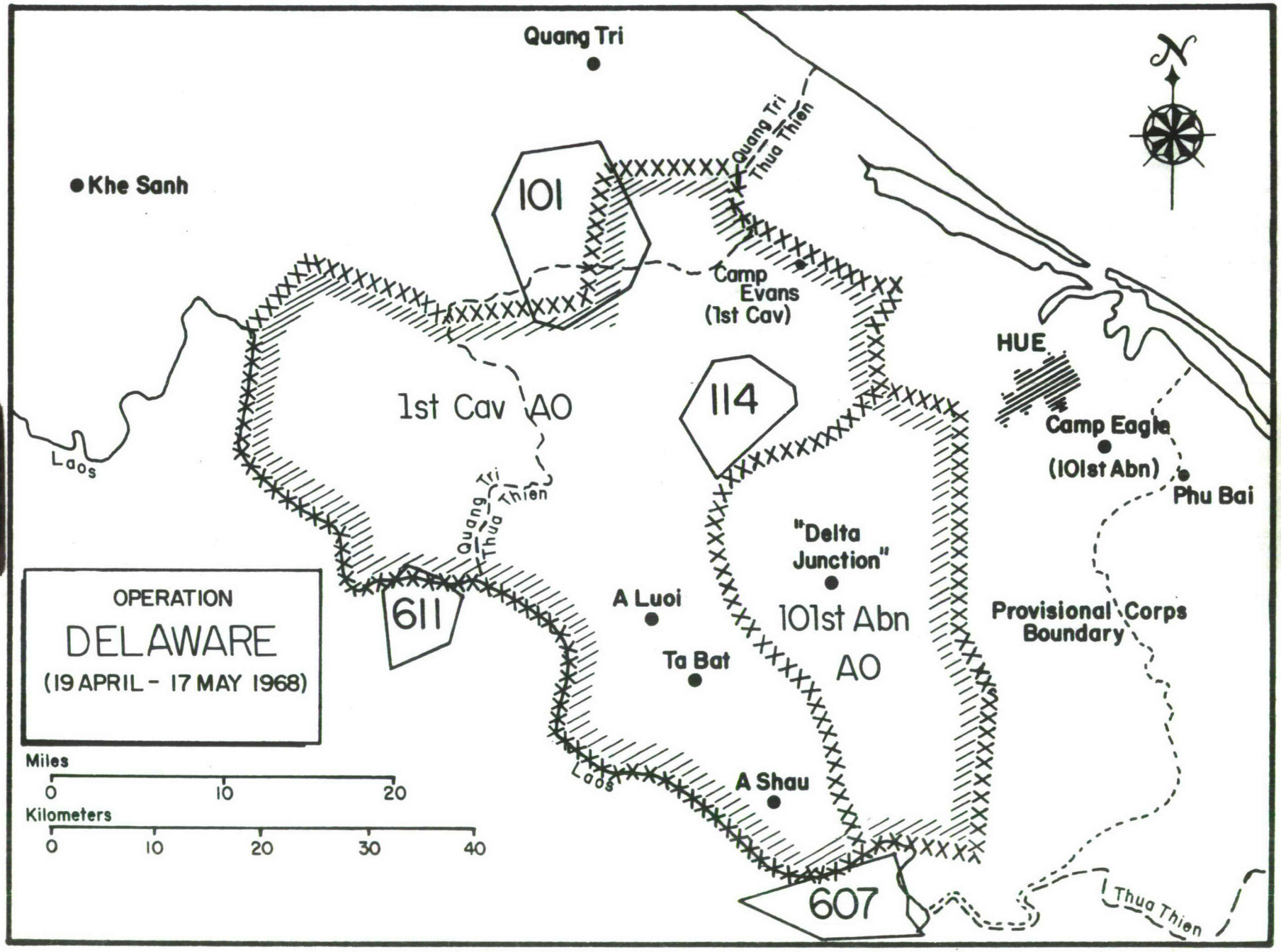

Quang Tri
Khe Sanh
101
Quang Tri
Thua Thien
Camp
Evans
(1st Cav)
HUE
1st Cav AO
114
Camp Eagle
(101st Abn)
Phu Bai
Laos
Quang Tri
Thua Thien
"Delta
Junction"
611
A Luoi
101st Abn
AO
Provisional Corps
Boundary
Ta Bat
OPERATION
DELAWARE
(19 APRIL - 17 MAY 1968)
Laos
A Shau
Miles
0 10 20
Kilometers
0 10 20 30 40
607
Thua Thien

FIGURE 1

[redacted]

OPERATION DELAWARE

Introduction

During the first half of 1968, the enemy expanded his road and logistic system along the western borders of I and II Corps. New roads were built east from the A Shau Valley, south from the valley toward Da Nang, and in the vicinity of Kham Duc (abandoned by the Allies in May). To counter these enemy pressures along the western border, interdiction programs were stepped up. Tac air and ARC LIGHT were concentrated on several enemy roads designated as Specified Strike Zones. In the A Shau Valley and the road east out of the valley, Projects GRAND CANYON and BUFFALO (both 1-18 April) monitored the tac air used in an interdiction role. A total of 468 tac air sorties and 375 ARC LIGHT sorties supported the projects. On 19 April, the Army put ground troops into the valley in Operation DELAWARE. A total of 2,529 tac air sorties and 442 ARC LIGHT sorties supported the four-week operation.

Unlike the battles of Loc Ninh, Dak To, and Khe Sanh, there were no heavy concentrations of enemy combat troops that threatened U.S. forces. After the initial assault, the Army moved down the A Shau Valley in a methodical, though mobile manner, using air to prep landing assaults, suppress antiaircraft weapons, and strike enemy personnel and material encountered.

DELAWARE had an ARVN phase called LAM SON 216, which is covered only briefly in this study. ARVN forces did not land in the valley until ten days after the American assault, and LAM SON 216 ended five days before DELAWARE ended. ARVN forces reported killing 130 enemy, while losing 26 men, against U.S. statistics of 142 friendly and 739 enemy dead. By the time

[redacted]

the ARVN reached the valley, most of the antiaircraft defenses had been suppressed and most of the enemy had fled.

Enemy Logistics and AAA

In March 1966, the A Shau Special Forces Camp was abandoned under imminent threat of being overrun (CHECO Report, "The Fall of A Shau", 18 Apr 66), and for two years the Allies left the mist-shrouded valley to the enemy. Then, during Operation DELAWARE/LAM SON 216 (19 April - 17 May 1968) American and Vietnamese troops returned in force to destroy enemy supplies and capture a significant number of heavy weapons, including twelve 37-mm antiaircraft weapons. (Fig. 2 and Appendix I.) Further, they effectively harassed and interdicted the enemy stronghold for one month by the most certain means available--the occupation of the valley by allied troops. Significant developments from the A Shau operation included the heavy loss of helicopters in the face of massed AAA, and the intermittent disruption of American plans by very bad weather.

The importance of the A Shau area arose from its use for sizable NVA infiltration into South Vietnam and the elaborate road system that facilitated the expanding enemy logistics base. Down the Laotian Panhandle ran the main north-south road network, and off that trunkline branched the roads leading to I Corps. Route 922 cut through the enemy Base Area 611 in Laos, and joined the north end of the A Shau Valley. (Fig. 5.) These roads were not jungle trails, but well-built motor routes such as Route 922, which remained open during the wet seasons.[1/] Indicative of the enemy's mechanized supply system, Operation DELAWARE captured more than 60 trucks, mostly damaged, but some still serviceable.[2/] Most of the trucks in the valley

CAPTURED 37-MM AA GUN
Figure 2

presumedly were moved across the border when the American troops appeared.

Route 922, the key to the NVA logistic system in northern and central I Corps, accommodated much of the traffic moving through Laos. In the fall of 1967, the 460th Tactical Reconnaissance Wing labeled Route 922 one of the primary routes of resupply from Laos south of the DMZ. 3/ Six months later, other intelligence indicated that "approximately 80 percent of the traffic passing through Laos in the Tchepone area terminates in Laos opposite I Corps or enters northern I Corps" and that "Route 922 in Laos is one of the most heavily used roads in the Tchepone area." 4/

Of even more concern than these roads from Laos, were those being built straight for Hue and Da Nang. In the A Shau, Route 547A bypassed the old eastern exit from the valley, one effectively interdicted by the Air Force and never repaired by the NVA. A captured enemy document stated the new 25-kilometer road was built in 80 days to facilitate sending reinforcements to fight around Hue. 5/ Farther south, the valley Route 548 was being extended east toward Da Nang, and had the American nicknames "Da Nang Expressway" or the "Yellow Brick Road". In mid-April the Directorate of Intelligence, 7AF, summarized the situation: 6/

> *"Units in Thua Thien Province receive their supplies through Base Areas 610 and 611 via Routes 921 and 922. The enemy has recently significantly increased his movement through this area into A Shau Valley and east over Route 547 towards Hue. An extension of Route 548 towards Da Nang indicates the enemy's intention to neutralize our own significant logistics capability at the major deep water port and airfield complex in I Corps. Base Area 607 due west of Da Nang, just inside*

the Laotian border, is taking on new significance and may be a key enemy supply area with a major road network running in four directions. Although not confirmed, the enemy may plan to extend Route 548 northeast from a point 30 kilometers inside SVN to the enemy area around Ruong Ruong (a third of the way to Da Nang in a straight line from A Shau).

When allied troops entered A Shau, they met few regular NVA infantry units because the valley was held by rear service detachments--specifically, the 559th NVA Transportation Group. A notebook confiscated during DELAWARE mentioned four missions of the 559th Group:[7]

Perform transportation services;

Control infiltration units;

Establish additional roads;

Maintain road security by combating enemy air raids.

The document also mentioned that the 7th Military Station in western Thua Thien Province would move an increased amount of supplies during June through August 1968 in an apparent attempt to establish an all-season logistics movement.

To defend this growing complex of roads, base areas, and storage depots, the enemy installed a high density of AAA in the A Shau Valley. By March, 7AF had declared a 2.5 nautical mile radius around a 37-mm gun in the central A Shau as a groundfire high threat area.[8] Through March and April, further Air Force reconnaissance in A Shau discovered 12.7-mm positions, the primary NVA AAA in South Vietnam. By then, the 37-mm AAA high threat area had been

extended to include 2.5 nautical miles on either side of Routes 548 and 547.[9] In late March, Special Forces reconnaissance teams discovered more than 3,000 rounds of 23-mm AAA ammunition in the Route 547 area 21 kilometers southwest of Hue.[10] These defenses indicated the importance of the A Shau Valley as a rear area logistics base for the enemy's plans against Hue and Da Nang.

Air Interdiction Campaign

In the two years after the fall of A Shau, the U.S. effort in the valley was essentially limited to reconnaissance and occasional bombing. The stepped-up road building and infiltration by the enemy in early 1968, however, invited an increased U.S. response tailored to the isolated in-country LOCs.

One approach was a centrally managed aerial interdiction program. In late March, 7AF replied to a request by COMUSMACV regarding the desirability of employing gravel mines and the feasibility of using MK-36 destructors in the A Shau Valley. The use of air-delivered mines could be most effective when employed to maximize the hazard to enemy movement and the difficulty of clearing. The use of Gravel, however, was not recommended, because of the high level of enemy defense in the valley and the requirement for low-level delivery.[11] Soil conditions were considered appropriate for the MK-36, but due to the six-month (± 3 months) self-destruction feature, the weapon was not recommended if friendly action was contemplated in the valley. Dragon-tooth mines were recommended to be seeded in a statistical way, which would generate personnel casualties and temporarily fix truck targets. In addition, long-delay bombs and road cuts were considered feasible and practical. These

proposals were not implemented since the DELAWARE operation would move ground forces into the area.[12/]

In late March, 7AF directed appropriate Direct Air Support Centers (DASCs) to obtain designated strike areas "where strikes can be put in under FAC control without further clearance."[13/] Six areas of special interest in I and II Corps were suggested, two of which ran through the A Shau Valley. Also, the two Tactical Air Support squadrons in the corps were directed to fly the six target areas at least once a night and to initiate action to obtain immediate approval through the DASCs for strikes on lucrative targets discovered.

The latter procedure went through the routine authorized channels in securing the appropriate ground commander and Vietnamese approval. Relief from that requirement was sought in obtaining strike areas where FAC-controlled strikes could be put in without further clearance. On 30 March, III Marine Amphibious Force (III MAF) informed 7AF that harassment and interdiction would be considered the same as close air support and would be processed through the ground commanders.[14/] On 6 April, 7AF responded by acknowledging that MACV (specifically, the Tactical Air Support Element--TASE) had no plans to provide 7AF with clearances and free strike zones for an in-country interdiction program. Therefore, 7AF would "execute strikes on enemy LOCs in-country upon receipt of individual strike requests from MACV (TASE)".[15/]

Thus, no formal 7AF-directed interdiction campaign was initiated in the A Shau Valley in April. However, on 1 April, 7AF initiated its southwest

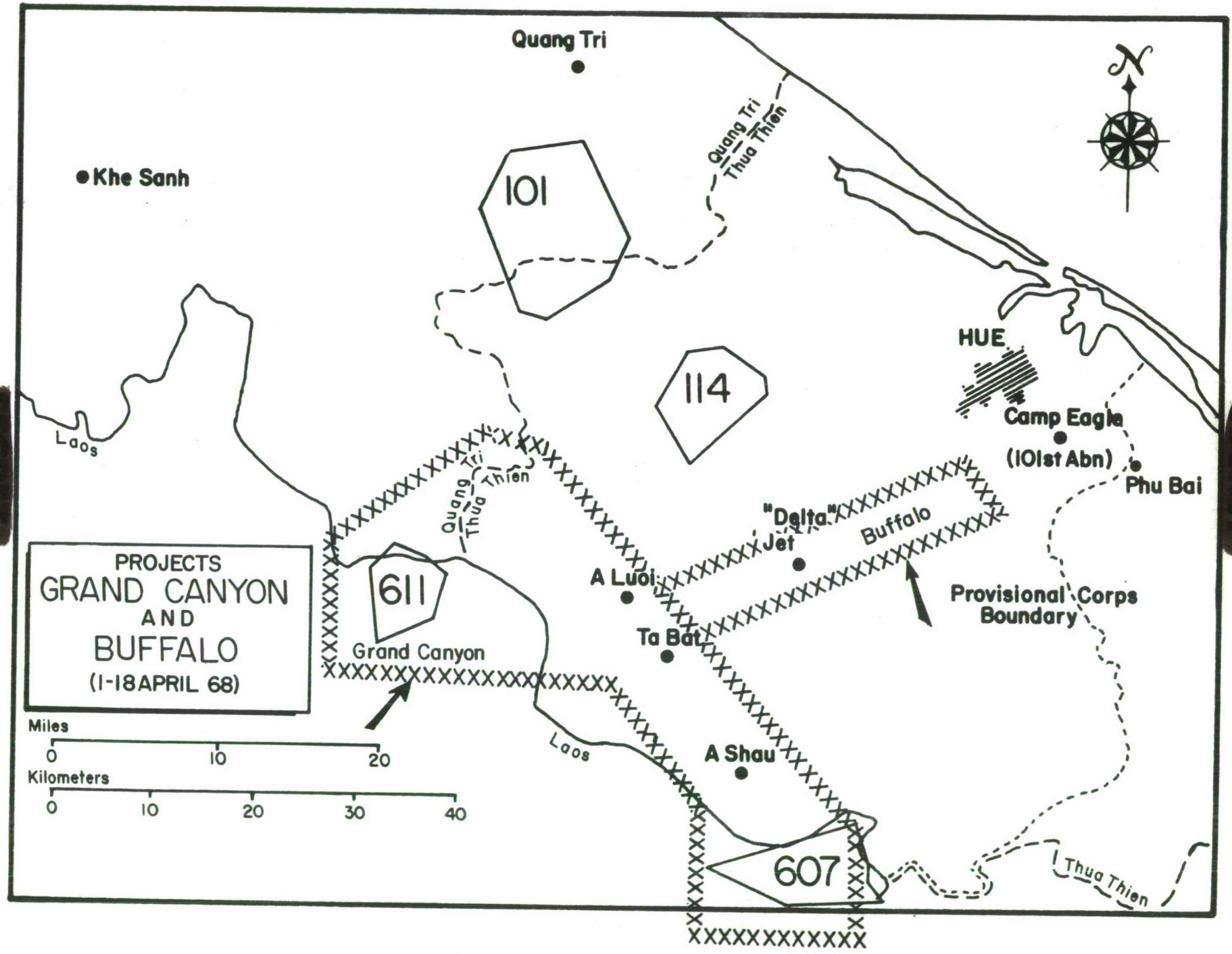

Quang Tri
Khe Sanh
101
Quang Tri
Thua Thien
114
HUE
Camp Eagle
(101st Abn)
Phu Bai
Laos
Quang Tri
Thua Thien
"Delta"
Jet
Buffalo
A Luoi
Provisional Corps
Boundary
611
Ta Bat
Grand Canyon
PROJECTS
GRAND CANYON
AND
BUFFALO
(1-18 APRIL 68)
Miles
0 10 20
Kilometers
0 10 20 30 40
Laos
A Shau
607
Thua Thien

FIGURE 3

monsoon interdiction campaign in southern Laos, Route Package I, and in-country border areas. [16/] In-country areas of interest were designated where airpower was primarily used for interdiction. Strike sortie totals for the areas were tabulated. In A Shau, the areas were GRAND CANYON and BUFFALO. (Fig. 3). Those two projects extended from 1 to 18 April, with 375 ARC LIGHT and 468 tactical air sorties provided, nearly all from Air Force resources. [17/] (Appendix II.)

In mid-April, COMUSMACV considerably broadened the interdiction program in the extended area of battle in SEA. A Seventh Air Force message to III MAF stated:

> *"On 17 April COMUSMACV approved the immediate commitment of B-52 sorties and additional out-country strike resources in a major expansion of the air interdiction campaign in the extended battle area...In the furtherance of this effort COMUSMACV has authorized direction coordination between 7th Air Force and major field commands for the identification of targets and the establishment of specified strike zones as set forth in MACV Dir 95-4.*
>
> *"In order to ensure flexibility for the air interdiction campaign, ground commanders would establish specified strike zones and authorize 7th Air Force to direct strikes into those areas on sustained, around-the clock basis without further political clearance or tactical approval."*

On 26 April, 7AF proposed an initial 33 "segments" of LOCs in-country as targets meriting being specified strike zones. [19/] Those in I Corps were all related to the A Shau Valley: Routes 922, 547A, 548, and the extension of 548 (the Yellow Brick Road). Since, as III MAF noted, those areas were temporarily occupied by U.S. ground forces in Operation DELAWARE, they could not be made Specified Strike Zones. But, III MAF promised: [20/]

"When current ground operations permit striking the nominated target areas or when other appropriate targets are identified, specified strike zones will be established IAW MACV Dir 95-4 and necessary information forwarded to Cdr, 7th AF, and COMUSMACV."

On 31 May, the A Shau Valley was designated SSZ Victor by the III MAF, with boundaries considerably reduced from those of GRAND CANYON and BUFFALO.[21] (Fig. 4.)

Questions of command and control and the relationship between the in-country interdiction program and the out-country program (called TURNPIKE) go far beyond the limits of this study. The in-country interdiction program grew out of NIAGARA, the SLAM-type operation employed in the defense of Khe Sanh. In several areas of NIAGARA, the rules of engagement were comparable to those later applied to specified strike zones such as SSZ Victor in A Shau.

Inception of DELAWARE

Few areas in South Vietnam were more ideally located for the enemy than the A Shau Valley. Less than 30 miles southwest of Hue, beyond some of the country's densest mountain jungles, the valley had easy access to the northwest, west, and south into Laos because the river valleys drained west. In fact, nearly impenetrable mountains in bordering Laos funneled NVA infiltrators through A Shau. Enemy troops heading south around the DMZ moved through the valley and out the southern end, back into Laos. For instance, the 36th NVA Regiment out of North Vietnam passed through the valley in early April, and moved to the new road being built toward Da Nang.[22] To the east of the A Shau Valley, the mountains and jungle acted as a shield, screening enemy

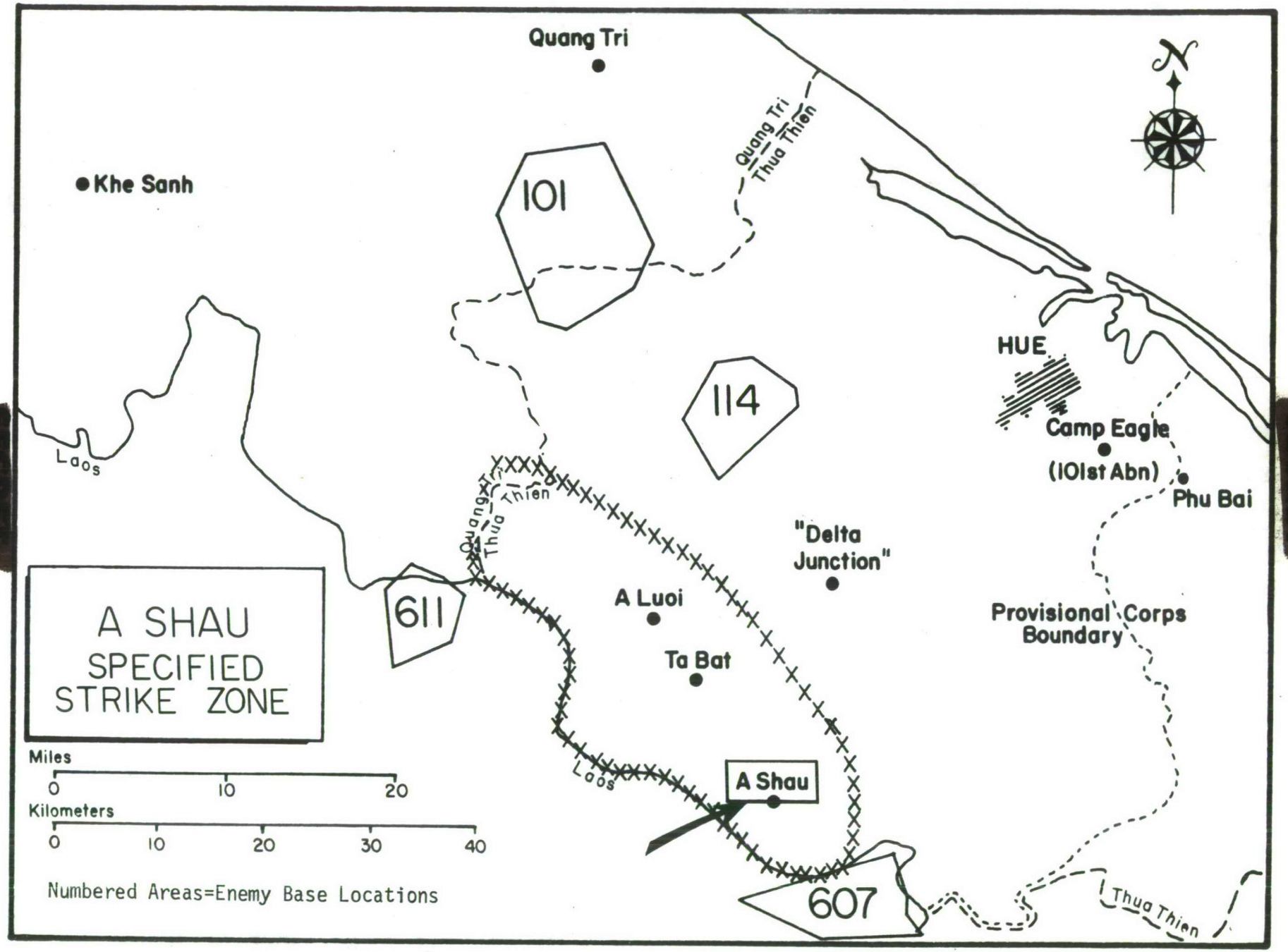

Quang Tri
Khe Sanh
101
Quang Tri
Thua Thien
114
HUE
Camp Eagle
(101st Abn)
Phu Bai
Laos
Quang Tri
Thua Thien
"Delta
Junction"
611
A Luoi
Provisional Corps
Boundary
Ta Bat
A SHAU
SPECIFIED
STRIKE ZONE
Miles
0 10 20
Kilometers
0 10 20 30 40
Laos
A Shau
607
Thua Thien
Numbered Areas=Enemy Base Locations

FIGURE 4

activities from the Allies on the coast.

Weather also drew a cloak over enemy activities. Either low overcast and fog or thunderstorms and heavy rain hid the valley most of the year. Air access to the valley was curtailed nearly the whole year, because the A Shau Valley lay exposed to the influence of the northeast and southwest monsoons. By all approaches, the winds had to climb to reach the valley and this upslope wind-flow contributed to thunderstorm activity and the formation of low clouds and fog. From May to November, heavy rains made the poorly drained valley very marshy. When the rains decreased in November, fog and low overcast returned with the northeast monsoon off the South China Sea. Just such poor weather had prevented tac air from successfully defending the A Shau Special Forces Camp in March 1966.

Notwithstanding the poor weather experienced during DELAWARE, the valley's best weather normally came in April and May, during the transition between the monsoons. 23/ With the changing winds decreasing the chances of fog, with the valley floor relatively dry, and with the heavy rains not expected until late May, the once-a-year opportunity was at hand. In early April, the 1st Cavalry Division (Airmobile) finished Operation PEGASUS (31 March - 15 April) around Khe Sanh and became available for a new operation. Plans were drawn to exploit the good weather by air assaulting the division into the valley.

Such an operation made sense in light of enemy activities in the two provinces south of the DMZ. Heavy NVA infiltration had drawn the 1st Cavalry and the 101st Airborne Division into the Marine area of operation in the two

northernmost provinces. In recognition of those two U.S. Army divisions (plus the 196th Light Infantry Brigade), and the enemy troop buildup, COMUSMACV created Provisional Corps Vietnam (PCV) to include Quang Tri Province and the northern two-thirds of Thua Thien Province. The PCV Headquarters and its DASC Victor began operations at Phu Bai in early March, assuming, among other responsibilities, the defense of Hue and the control of NIAGARA and PEGASUS. To coordinate post-PEGASUS operations, PCV, on 12 April, published OPLAN 2-68 outlining the areas of responsibility for the 1st Cavalry, the 101st Airborne, the 3d Marine Division, and the 196th Light Infantry. 24/

Basically, the 1st Cavalry would be prepared to pass control of the Khe Sanh area to the 3d Marine Division, and be ready to conduct "reconnaissance in force" in the A Shau Valley. The 196th Light Infantry--the PCV Reserve Force--would be OPCON to the 1st Cavalry and deploy around 1st Cavalry Headquarters at Camp Evans north of Hue. The 101st Airborne would defend Hue and strike west along Route 547.

On 15 April, OPLAN 3-68, under the title Operation DELAWARE/LAM SON 216, superseded OPLAN 2-68, and specifically detailed that joint U.S.-South Vietnamese operation. 25/

The 1st Cavalry would provide one brigade task force (two battalions), OPCON to the 3d Marine Division, and also conduct a reconnaissance in force with its other two brigades in the A Shau Valley, in coordination with the 3d ARVN Infantry Regiment. It would assume OPCON of the 196th Light Infantry to screen Camp Evans and, as the PCV Reserve, be ready for commitment to Khe

Sanh, A Shau, Route 547/547A, enemy Base Areas 101 and 114, or along the coastal plains and the bordering hills.

Prior to DELAWARE, the 101st Airborne had been moving southwest along Route 547 toward Route 547A, the NVA-built road that went into the A Shau. The division would send one brigade to the junction of 547/547A--called Delta Junction--in coordination with an ARVN Airborne Task Force. From there, the brigade would be prepared to move west along 547A, north down the Song Bo Valley toward Base Area 114, or south up the Rao Nai Valley.

Each division received its own area of operation (AO), making DELAWARE actually two separate though contiguous operations. (Fig. 1.) Thus, in the management of air resources, each division was tasked with nominating targets for ARC LIGHT, tac air, and aerial mine seeding. For planning purposes, an estimated 140 daily close air support sorties were allocated, 80 to the 1st Cavalry and 60 to the 101st Airborne. A Shau had the top priority for airstrikes. A further breakout of target priorities was as follows: 26/

Priority 1: Significant Strategic Targets

- Route 922 and other routes of access and egress to the A Shau Valley
- Route 547A
- Song Bo Valley

Priority 2: Significant Tactical Targets

- Fortified positions
- Antiaircraft/automatic weapons positions
- Logistic support bases
- Assembly and marshaling areas

Each division made strike recommendations and requests to PCV, which assigned priorities, reconciled any conflicts, and forwarded its target list to III MAF, which forwarded it to TACC, 7AF, and to B-52 targeting, MACV.

In recognition of the strict separation of the 1st Cavalry and 101st Airborne operations, this study treats them individually--first the 101st Airborne is discussed and second the 1st Cavalry. General observations on the air role in DELAWARE and interdiction in the A Shau are also provided.

101st Airborne at Delta Junction

Unlike the 1st Cavalry's four week hit-and-run assault in the A Shau, the 101st Airborne's road-clearing operation began before and continued after DELAWARE. The mission of the 101st Airborne was to seek and destroy enemy forces around Delta Junction and to be prepared to strike either west along Route 547A, south up the Rao Nai River, or north down the Song Bo River.[27] The enemy also used these various routes out of the Delta Junction cross-roads and, for that reason, allied troops moved in to harass and destroy.

In March, several Delta Teams, 5th Special Forces Group, on long-range reconnaissance patrols reconnoitered the area where the enemy's new Route 547A crossed the Rao Nai Valley. At the same time, a large enemy cache of 23-mm rounds was discovered by a Delta Team, spotlighting the NVA buildup threatening Hue, and giving a small suggestion of the enemy stores that must exist deeper in the mountains.[28]

By early April, the 1st Brigade, 101st Airborne, was pushing west along

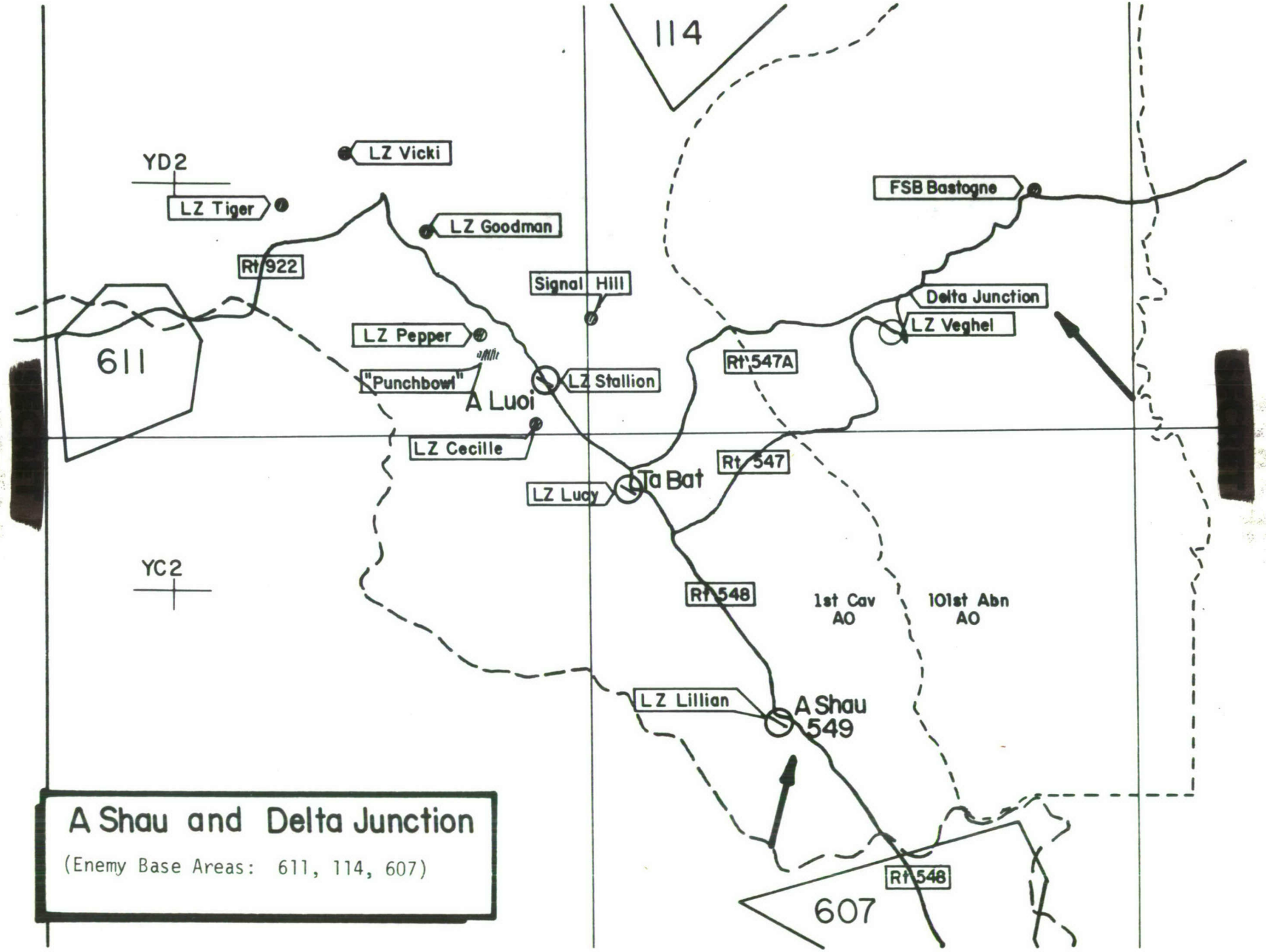


FIGURE 5

A Shau and Delta Junction

(Enemy Base Areas: 611, 114, 607)

Route 547 with a control post located at Fire Support Base (FSB) Bastogne ten kilometers northeast of the junction.[29] In the DELAWARE phase of the road clearing operation, the brigade would air-assault into Delta Junction and later be joined by troops coming up the highway.

The desired landing zone for the air-assault lay atop Hill 333, northwest of the junction. Despite repeated attempts, air-delivered ordnance could not clear a landing zone in the exceedingly dense canopy. The 101st Airborne and the 3d ARVN Brigade Task Force commanders agreed that it was the thickest jungle they had ever seen.[30]

A FAC for the 101st Airborne made the same point when describing the attempt to blast an LZ on or near the hilltop:[31]

> *"The LZ construction was to be by 750-pound bombs with the daisy cutter or fuze extended. The 750-pound bombs were ineffective and it was requested that we use 2,000-pound bombs. These were fairly effective. The trees measured 18 inches to five feet in diameter and 100-200 feet high, plus there was single and double canopy jungle. The first LZ construction attempted only cleared branches and leaves from the trees. We did not consider that the ordnance dropped did the job.*
>
> *"The second area attempted was another area of very thick vegetation and again the 2,000 and 750-pound daisy cutters did not do the job. This was partly due to the weather because ceilings of 2,500 feet forced low angle deliveries. When the bombs were released, there was a greater dispersion rate. The bombs were hitting 30-40 meters apart instead of all centering in one area. Steep dive angle and the bombs jettisoned all at once and hitting the one area would clear the trees out with a little more efficiency."*

The Air Liaison Officer (ALO) for the 1st Brigade, 101st Airborne, made the same observations:[32]

"There was a great deal of ordnance expended on Hill 333 in an effort to cut the vegetation to allow the helicopters to get in there. There were over 320 bombs ranging from 750-pounds to 2,000 pounds HE expended on Hill 333 and still it didn't do the job...."

With Hill 333 unobtainable, the LZ was cleared in a small valley of elephant grass, bamboo, and small trees. This was necessary despite the undesirability of putting LZ VEGHEL in a valley 100-to-200 meters below the surrounding hills. Napalm and various sized bombs cleared the LZ. 33/

At 1100 hours on 19 April, an airborne battalion air-assaulted into LZ VEGHEL and encountered light mortar and ground fire. Two helicopters suffered major damage from ground fire around the LZ site, a routine occurrence for a hot LZ landing. 34/ The 101st Airborne was fortunate in not encountering heavy AAA of 23-mm and 37-mm size such as were found in the A Shau Valley. The Delta Junction area and the hills north of Route 547A were defended with .50 caliber and 12.7-mm guns, and the usual automatic weapons fire. 35/ (During NEVADA EAGLE, which followed DELAWARE, the 101st Airborne did capture several 23-mm guns five kilometers west of LZ VEGHEL. 36/ (See Fig. 6.)

After securing the LZ and surrounding area, the initial battalion was joined by a second battalion, which worked down the Rao Nai River and then, after encountering few enemy, air-assaulted on 6 May into Fire Support Base Strike near enemy Base Area 114. 37/ A third battalion of the 1st Brigade moved west from FSB Bastogne. Also, during DELAWARE, elements of the 3d ARVN Task Force moved west from LZ VEGHEL, encountering moderate enemy

ENEMY 23-MM AA GUN (BARREL MISSING)
Figure 6

resistance and uncovering numerous enemy caches.[38] On 11 and 12 May, the ARVN Airborne returned to Hue, while the 101st Airborne continued searching out the enemy along Route 547 and in the Song Bo Valley.[39]

According to the Commanding General of the 101st Airborne, the twin problems encountered during the DELAWARE portion of the Route 547 operation were weather and dense jungle.[40] Bad weather disrupted resupply operations but, fortunately, it was not as bad as in the A Shau and did not last for extended periods. The dense jungle, of course, slowed the ground troops and lessened effectiveness of tac air and aerial reconnaissance. These were routine problems, however, common in the Central Highlands and did not alter the fact that DELAWARE for the 101st Airborne was a standard operation, which had more success in destroying enemy supplies than in killing enemy troops.

1st Cavalry in A Shau

Seizure of the A Shau Valley by the 1st Cavalry and ARVN units was the crux of DELAWARE, and the weather governed much of the operation schedule. Even more so than around Delta Junction, the weather disrupted U.S. plans in the A Shau Valley, delaying D-Day, preventing the timely installation of artillery, and the GCA unit, hampering cargo drops, and impeding delivery of the construction equipment needed to repair A Luoi Airfield. Most crucially, bad weather for two days after D-Day gave the enemy time to flee the valley without much fear of firepower, because artillery and tac air were excluded from the valley. For instance, at 2225 hours on D-Day, a 50-60 vehicle convoy was spotted from LZ TIGER moving south outside maximum range of friendly artillery.[41] Yet, despite inclement weather, the accomplishments

of the 1st Cavalry and ARVN units were marked. On-the-spot intelligence gave a broad and detailed understanding of northern I Corps enemy logistics, and large quantities of supplies were destroyed as Allies moved freely through the hub of the NVA's logistics base in PCV. Considering the NVA's attempt to sustain an offensive in Quang Tri and Thua Thien Provinces, disruption of the supply line was a setback for the enemy.

Although this study does not detail the 1st Cavalry and ARVN movements in the valley, a chronology is provided. From 13 to 18 April, the airmobile reconnaissance squadron of the division prepped the valley and directed tac air in destroying as many AAA sites as possible. On D-Day, the 3d Brigade, 1st Cavalry, air-assaulted into LZs TIGER and VICKI, at the north end of the valley, and had nine helicopters destroyed or heavily damaged. During the next three weeks, several more LZs were established in a skipping movement south through the valley. These included the 3d Brigade seizing A Luoi Airfield and the ARVN Infantry landing at the Ta Bat and A Shau airstrips. Withdrawal from the valley began on 10 May, and DELAWARE ended a week later.

The chronology of events was as follows:

DATE	EVENT
APRIL	
13 (D-6)	1/9th Cav began preliminary visual reconnaissance. No tac air used. 42/
14-15 (D-5-4)	Weather hampered VR, delaying D-Day two days. 43/ On 14 April first tac air put in. 44/
16-18 (D-3-1)	Three "good-weather" days used by 1/9th Cav to prep the valley. 45/

DATE	EVENT
APRIL	
19 (D Day)	Operation DELAWARE initiated 0905H. 1st Bde, 1st Cav Div, air-assaulted into LZ TIGER (Hill 1228) and LZ VICKI (Hill 890) with heavy helicopter losses around TIGER. Signal Hill (Hill 1487) occupied as communications relay. 46/
20-21 (D+1+2)	Bad weather severely hampered operations, preventing airlift of artillery. Enemy convoys fled into Laos under protection of low cloud cover. 47/
22 (D+3)	Weather improved and DELAWARE began to roll. LZ GOODMAN occupied by overland march from LZ Vicki. 48/
23 (D+4)	LZ Pepper air assaulted. 49/ 155-mm howitzers airlifted in by Flying Crane. 50/
24 (D+5)	LZ Cecile air-assaulted. 51/ More artillery delivered to LZs PEPPER and GOODMAN. 52/
25 (D+6)	3d Bde, 1st Cav Div, air-assaulted into LZ STALLION (A Luoi Airfield). 53/ Three 37-mm AAA guns captured. 54/
26 (D+7)	First C-130 cargo drop. One C-130 downed by 37-mm with eight killed. 55/
27 (D+8)	Weather deteriorated and continued poor for several days, delaying delivery of heavy equipment to open A Loui airstrip. 56/
28 (D+9)	An O-2 from Quang Tri to A Shau missing in action, cause unknown. 57/ 1/3d ARVN Inf air-assaulted LZ Gunport (later renamed LZ LUCY). 58/ One PT-76 tank discovered, believed destroyed by tac air. 59/
MAY	
29 Apr-1 May (D+10+12)	Reconnaissance-in-force continued in the valley. Many sizable caches discovered. On 29 April engineers began repairing A Luoi airstrip. 60/ On 30 April, four 37-mm guns captured. 61/ On 1 May, A Luoi opened to C-123s; C-130 drops continued. 62/
2 (D+13)	First C-7 landed A Luoi. 63/

DATE	EVENT
MAY	
3 (D+14)	F-100 short round injured 23 men of the 1st Bde. 64/
4 (D+15)	Last C-130 drop flown as A Luoi accepted first C-123s and C-130s. 65/
5-9 (D+15+19)	Reconnaissance in force continued. On 6 May, 1/2d ARVN Inf moved to LZ Lillian near A Shau Airfield. 66/ On 6 May, two Marine A-4s collided over A Luoi, destroying both aircraft. 67/ On 8 May, 50 trucks were discovered, all badly damaged or destroyed by tac air. 68/
10-11 (D+20+21)	Majority of U.S. and ARVN withdrew from valley. On 11 May, 3d Bde CP closed Camp Evans. 69/ Retrograde airlift removed 160 tons. 70/
12-16 (D+22+26)	Remaining allied elements continued searching out enemy supplies. On 12 May, an underground hospital was discovered. 71/ Troop withdrawals continued daily. On 16 May, 1st Bde CP closed Camp Evans. 72/
17 (D+27)	Operation DELAWARE terminated at 1200H. 73/

D-Day at TIGER

Responsibility for preparing the A Shau Valley for the air-assault of two 1st Cavalry brigades fell to the 1st Squadron, 9th Cavalry, the division's reconnaissance squadron. Unique in Vietnam, this squadron was a completely airmobile cavalry unit. Although the 1st Cavalry was often called the 1st Air Cavalry Division, its correct designation was the 1st Cavalry Division (Airmobile), in recognition of the separation of the division's infantry and helicopter elements. The 1/9th Cavalry, however, was completely airmobile, with four troops ready to fight from their Cobras and Hueys, or on the ground if necessary. One of its functions was to provide visual reconnaissance and,

during the pre-DELAWARE prepping period, the division relied on the squadron rather than Air Force data for locating airstrike targets in A Shau. 74/

This ability to make visual reconnaissance (VR) and to fight from helicopters made the 1/9th Cavalry the natural unit to prep the valley for the three days allotted that phase of DELAWARE. By mid-April the division's Operation PEGASUS had come to an end, releasing the 1/9th Cavalry to begin prepping the A Shau. On 14 April, the first tac air went into the valley under the squadron's direction, but bad weather curtailed operations until two days later. Thus, D-Day was postponed from 17 April to 19 April.

Close cooperation existed between the squadron and Air Force tactical air resources. This rapport arose from the airmobility of the squadron and its lack of organic firepower. Since most of the officers were rated, they were oriented toward air and relied heavily on tac air sorties, especially since their mobility often took them outside the range of artillery. 75/

The method of reconnaissance and its relationship to targeting tac air were summarized by the squadron's ALO: 76/

> *"One of the main advantages of the 1/9th here was that we had real intelligence. We started off with the PCV list of targets and started developing our targets from theirs. The helicopters went out and explored the valley, sending in spot reports to the squadron intelligence section. The intelligence section worked over all the reports from the spot reports, special intelligence, and combined them into an order of battle. We had very up to date intelligence.*
>
> *"The helicopters started getting out in the valley and their method is reconnaissance by fire, or better known as "pooping and snooping." They would go down to treetop level and they would locate a gun position or an enemy location*

by an actual eyeball-to-eyeball sighting. This is one of the reasons the 1/9th is so valuable for air power. When they made a sighting like this, they called it into the operations section--S-3--and we would determine if this was a target for tac air. We would immediately send fighters out to the area, the FACs would coordinate with the helicopters and the helicopter pilots would mark, and the air power would go in.

"The 1/9th is able to give very good target intelligence and the helicopter pilots are able to utilize tac air effectively and help the FAC locate the targets and help him in putting in the air power. Also, these helicopters are able to go in after the strike and give it a real good look over, low speed and very low altitude and get a very good read out of the damage."

Three objectives of the 1/9th were to knock out the enemy AAA sites, to determine safe flight routes from Camp Evans to the A Shau, and to gather general intelligence on enemy facilities. Choosing the route proved the easiest. Noting concentrations of AAA around A Luoi and on the northern side of the valley, the squadron favored a route west from Evans to a point where the helicopters approached the valley from northwest to southeast. That coincided with its recommendation to the division to assault down the valley rather than take the center around A Luoi and push both north and south. The recommendations were followed. 77/

Destruction of enemy AAA and gun positions was much more difficult and complete success could not be achieved, primarily because many gun positions were not located. Main AAA defenses encountered were 12.7-mm heavy machine guns, .50 caliber machine guns, and 23-mm and 37-mm AAA guns. (Appendix III describes capabilities of enemy AAA weapons.) By late March, intelligence had established that the 23-mm and 37-mm guns were in operation in Laos. 78/

Therefore, their appearance in the A Shau Valley was no surprise. The enemy also laid emphasis on training its personnel in the use of AAA against allied aircraft, as shown by the fact that seven small models of U.S. jets--probable training aids--were found in the general vicinity of two captured 37-mm guns near A Luoi. 79/

Gun positions for the 37-mm were in no discernible pattern. The ALO for the 1st Brigade described what he saw, while serving as the FAC in this early operation: 80/

> *"The gun pits for the .50 caliber weapons themselves were laid out in a classic triangle or diamond pattern in the vicinity of A Luoi. These positions were effectively taken out, so they were never a factor. The 37-mm seemed to be laid out quite indiscriminately--one here, one there--wherever they found a good place to put a 37-mm gun. It's quite possible the guns laid out around LZ Lucy were laid out in a more definite pattern. I can't comment too much on this because it was down in the ARVN AO and I just never got down there. But our scout birds indicated they seemed to be placed with some eye to controlling the approaches to LZ Lucy. Incidentally, this 37-mm gun was the probable cause of the loss of the C-130 (shot down 26 April south of A Luoi)."*

Another FAC described his impressions of the AAA sites and their impact on prepping the valley: 81/

> *"A big problem we had with the 37mm was that our scout birds could not locate them. They were for most purposes on flat or slightly rolling ground. They were not on the hillsides. They were well camouflaged and generally, the only time we knew they were in the area was when we got chased out of the valley by the 37mm....*
>
> *"We were seeking out automatic weapons positions--37mm sites. This went on for four or five days. Problems we encountered were the necessity of remaining at high*

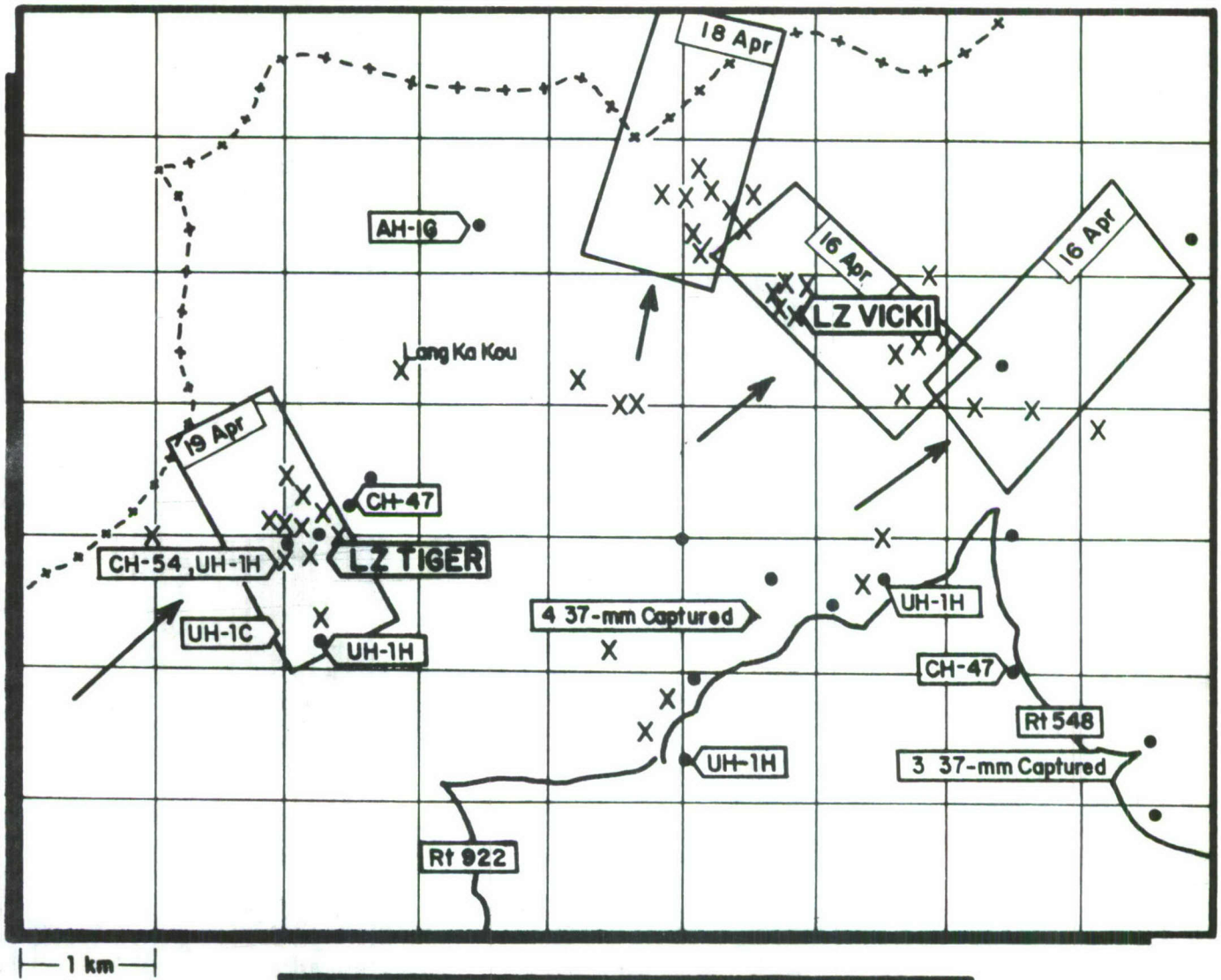
altitudes to avoid automatic weapons fire. We were required to abort several targets because the 37mm became too intense to work the targets. We would leave and go to another target for several airstrikes and then return to the original one when it had cooled down. This seemed pretty effective."

The Army Intelligence NCO for the 1/9th Cavalry agreed to the random placement, but thought the sites not confined to the lowlands: 82/

"In regard to positioning 37mm anti-aircraft in the A Shau, they were set up on the sides of mountains, they were set up on the valley floor, they were set on hill-tops. Actually, there was no set pattern of dispersement. The enemy just put in a regiment of anti-aircraft and used it where he thought it would be best."

In summary, the prep of the A Shau area was done mainly through VR by low flying helicopters, although some of the initial targets came from target lists developed from Air Force photo reconnaissance. This helicopter "reconnaissance by fire" relied partly on the enemy exposing his position by firing on the helicopters. It was not completely effective. Just as the enemy was often wise not to fire on a FAC aircraft that might bring down airstrikes, so many of the NVA in the A Shau laid low until occurrence of an actual troop assault. Another version of the same technique was to construct many extra weapon positions and rotate their use. Both these procedures were especially effective around LZ TIGER on D-Day.

The assault into LZ TIGER and LZ VICKI cost the 1st Cavalry nine helicopters destroyed and one heavily damaged, an outcome that reportedly caused the division's commanding general to comment, "Hell, I've never lost that many in weeks and weeks. By far, it's the hottest place we've gone into and the



LZ's TIGER and VICKI, 14-19 APRIL 1968

LEGEND: X TAC air missions, excluding Army gunships.

● Approx locations enemy positions.

□ ARC LIGHT target boxes.

FIGURE 7

most losses we've taken in a single day." The Associated Press also quoted the general as saying that his helicopters had run into "very sophisticated and damn good anti-aircraft forces." 83/

Those heavy losses were apparently caused by a combination of effective enemy planning, and at least a little confusion among Army helicopter pilots concerning immediate flight approaches to LZ TIGER. Figure 7 shows the terrain, the enemy positions discovered by the 1/9th Cavalry by D-Day, the location of tac air and B-52 strikes from 14 to 19 April, the sites of 37-mm guns later captured, and the impact points of downed, destroyed, and heavily damaged helicopters. Of special note was the large number of tac air missions put on LZ TIGER, and the ARC LIGHT strike just before the assault.

LZ TIGER lay on Hill 1228, the southeast prow of a small plateau commanding Route 922 out of Laos and the northern end of the A Shau Valley. Such an obvious potential LZ was made more obvious by the many tac airstrikes put there during the sudden flurry of U.S. activity begun on 14 April. Although many AAA sites were silenced around TIGER, others were not discovered until they began firing on D-Day. The FAC over TIGER that morning detailed the assault: 84/

> *"On the morning of the 19th, I was out there by 0630. I put in five flights of fighters as LZ prep on and around LZ TIGER. This was not necessarily aimed at putting out the 37mm sites. Rather, we were interested in getting Charlie's head down in the actual assault. The choppers were coming in from the northwest onto LZ TIGER which was their plan of attack for dropping their troops down. As soon as the first choppers set down on the ground Charlie started letting them have it with everything he had in the way of 37 with rounds bursting from 4,000 MSL to 7,000 MSL*

with occasional bursts up to 10,000 feet. There were 37mm, 57mm, and one radar-controlled 23mm (in the area just on the east side of TIGER in some dense foliage.) From what we understand and what we estimate, it (the 23mm gun) probably shot down a majority of the choppers that were in the area that day. However, it appeared to me that they were shooting wildly in a desperate attempt to get anything that happened to fly in the area. It was all straight up, not necessarily aimed at anyone--just putting it up in the hopes some chopper would fly through it. As you know, we lost quite a few choppers that day and apparently a lot of them did fly through the anti-aircraft fire."

Although belief in the existence of the 23-mm radar-controlled gun was widespread among division FACs and 1/9th Cavalry Intelligence personnel, and this assault included its usage, there was no evidence that either 23-mm and 37-mm weapons were radar-controlled or could accept radar data. 85/ Equipment of this type was not captured during DELAWARE, nor were these weapons encountered in North Vietnam and Laos.

Along with the FAC flying over LZ TIGER, others thought there was substantiating evidence of this weapon:

"I didn't relish flying around there with a 23mm radar-controlled gun. To my knowledge, we never did get around to knocking it out because we never could pinpoint it exactly. It was in dense foliage and it didn't work but every other day or every third day. They would come up and attempt a lock-on on an aircraft. We picked up a buzz on our FM when they were in a scan of their radar. Immediately, when we picked it up, we turned away from it 90° and dove for the ground, which always broke the lock."

The ALO for the 1/9th Cavalry was less certain: 86/

"The biggest factor in my mind that indicated there were radar-controlled anti-aircraft (weapons) in the valley was

the fact that some of the fire was extremely accurate. We know of 37mm fire, we know of .50 caliber fire, and there is a possibility there was a ZPU and also 23mm guns. As far as I know, the ZPU and the 23mm are not confirmed."

The 1/9th Cavalry Intelligence NCO also thought there were radar-controlled guns in the valley: 87/

"As far as radar was concerned, we did run into radar controlled 37s. Through debriefing of pilots not only here but at division headquarters, we had determined that a 15-second tone interference on FM radio followed by a short break, followed by another interference, another short break, a third interference, and a gun firing was the pattern. The first tone was the initial radar track, the second tone being the tentative fix on the target, and the third tone would be the radar fix on target and the weapon firing.

"To counter this particular radar, the method employed was to break either 90° left or right. No increase or decrease in speed was particularly necessary; a 90° break to the left or the right would break the radar track."

An interesting sidelight concerning the reported radar lock-on was recounted by one FAC: 88/

"On two or three different occasions when I was controlling flights of F-4s just to the east of Tiger, on all occasions they reported a radar lock-on from the radar site in the area that was picking them up. In one case the F-4s reported a SAM site in the area with a lock-on on the aircraft. I told the fighters that in my estimation it was probably a 23mm radar-controlled gun rather than a SAM site. They said it was a SAM site and they knew it was not a 23mm radar-controlled gun or any radar-controlled gun. However, I still feel there are no SAM sites in the area and that it was simply the 23mm radar-controlled gun. The radar for the SAM sites and the radar for the guns are completely different. Some models of F-4s can not make out the difference; they just pick up a lock-on."

Thus, the helicopter losses of the first day were attributable to:

- Massed AAA weapons, probably including 37-mm and 23-mm guns.
- Intelligent enemy discrimination in the use of his AAA; i.e., not exposing the guns until the trooper assault.
- Correct analysis of Hill 1228 as a potential LZ.

There was also a possibility some Army helicopters might have strayed too far east from the approach corridor designated by the 1/9th Cavalry. According to the 1/9th Cavalry ALO: 89/

> *"The 1st Cavalry lost quite a few helicopters, especially on the first day--on D-Day. This was due in part to the fact that the brigade did not follow the air routes suggested by the 1/9th and to the fact that the enemy didn't always fire on the reconnaissance aircraft. Sometimes they waited for the more lucrative targets to come along--the Chinooks, Flying Cranes, and the C-130s."*

The ALO for the 1st Brigade happened to be over TIGER on the afternoon of the assault and saw the following: 90/

> *"The Hueys--the slicks--crossed almost due east of TIGER and these are the people who drew the heaviest fire. The guns seemed to be concentrated to the area immediately to the east and northeast of TIGER as if they had suspected this would be the actual approach to TIGER. The Army attempted to change the slicks' route around to use the same approach corridor as the Chinooks (i.e. coming in from the northwest) after they began to draw such intense fire, but this was only moderately successful. I suspect poor command and control and/or communications. And as a matter of fact, it wasn't until they were practically driven off from the corridor that they stopped using it."*

Thick jungle foliage, enemy tactics, and unfortunate experiences contributed to the high helicopter losses of D-Day. How, it might be asked,

was a 23-mm gun to be located in dense jungle, if the enemy did not expose the position until an actual troop assault? Even the 23-mm gun that shot down several helicopters around LZ TIGER could not be located, although it was within a mile of the landing zone. Appendix III indicates the 1/9th Cavalry located many AAA sites and obtained their destruction.

Events surrounding D-Day suggest that enemy AAA, increasingly available in South Vietnam, precluded successful suppression of the weapons in a long-time enemy base area without aircraft losses. The potential existed that complete eradication of AAA sites and weapons in a dense jungle environment might be achieved through:

- Heavy saturation bombing comparable to that used in the central A Shau Valley but not used in the northern A Shau. (See "ARC LIGHT" section for further discussion of this point.)
- Cooperation of the enemy, if he exposes his AAA sites by ineffective camouflage, troop concentrations, or gun firings.
- Tac air in conjunction with thorough reconnaissance by ground troops.

Controlling Tac Air

The geographical isolation of the A Shau Valley and the highly mobile operations of the 1st Cavalry demanded marked flexibility from the tactical air support system. For instance, a "high FAC" was stationed above the valley to relay communications and help with air traffic control. Yet, two serious accidents did occur: a short round incident injuring 23 troops and a midair collision destroying two Marine A-4s. (One O-2 and its pilot were

[redacted]

also lost, due to unknown causes, but no fighters were shot down.)

The primary technical problems for the FACs were direct communications with Camp Evans and Phu Bai. High mountains to the east necessitated a relay between the coastal lowlands and aircraft flying low over the valley. The Army solved this problem by putting communications relay equipment on Hill 1487, four kilometers northeast of A Luoi. That site--called Signal Hill--also had a 105-mm howitzer platoon.[91/]

For the Air Force, a high FAC proved adequate, especially since he could double in managing air traffic in the narrow valley. A FAC described the system, which had also been used at Khe Sanh:[92/]

> *"One of our big problems was communications in that control located at Camp Evans could not reach FACs when they were working in the valley. We solved this by ourselves by launching in flights of three. We kept one FAC at least 10,000 feet over the valley. He would coordinate with RASH control and funnel in the fighters to the two FACs working in the valley, whose floor was way below the tops of the mountains. It worked smoothly and we kept it up during the whole operation even when one of the brigades took a control party into the valley....*
>
> *"Another advantage to working three FACs was that we kept one FAC over the 3d Brigade area to the north and one over the 1st Brigade area to the south and the high man--the high FAC--would monitor their positions where they were putting in strikes. If they started working toward the center of the area, he would warn the FACs and the FACs would coordinate among themselves to keep the fighters separated. This is a very serious requirement in a small area such as we were working. We had to have maneuver room for the fighters and coordination among the FACs. It could'nt be done any other way without jeopardizing safety."*

[redacted]

Belief existed that use of a high FAC smoothed the funneling of aircraft into one of the appropriate low FACs and provided a measure of insurance in keeping separated the aircraft under control of different FACs. However, one mid-air incident did occur. On 6 May, two Marine A-4s collided over A Luoi. Both pilots recovered safely, while their aircraft were destroyed.[93]

An alternative to having a high FAC for communications was to take a Tactical Air Control Party (TACP) into the valley. The 1st Brigade followed this practice, however, the 3d Brigade did not. On D-Day, the 3d Brigade TACP was packed and ready to move to LZ TIGER, but did not go. Consequently, the TACP was off the air for at least three days according to the brigade ALO:[94]

> *"As a result we were off the air and out of control of the air strikes insofar as direct communications with the Forward Air Controllers were concerned. Division control and the 1/9th were handling our immediates and pre-plans for that day. Due to the lack of available airlift to move the brigade TOC (tactical operations center) out to the valley--a combination of poor weather and the loss of aircraft in the initial assault--it was undecided for approximately three or four days whether the TOC would move out to the valley. During this period we were packed up and ready to move on an hour to an hour and a half notice and we did not get back into operation until about the fourth day of Operation DELAWARE.*
>
> *"After resuming operations here at Evans, due to the high terrain between here and the valley, definite communications problems existed between our radio and the people working in the valley itself. As a result the FACs were positioned with one high man and this facilitated communications."*

The explanation for not moving the TACP seemed to be that weather, and the heavy loss of helicopters delayed the planned initial movement, and later

the brigade had learned to live with the delay. This, of course, removed the TACP from firsthand control of tac air in the 3d Brigade AO.

Conversely, as with so many aspects of the 1st Brigade assault into A Luoi, the movement of the 1st Brigade's TACP was routine and had been accomplished without incident, as noted by the brigade ALO: 95/

> *"The TACP went in immediately as part of the initial assault with the brigade tactical operations center. We attempted to use the backpack gear--the PRC-47 and PRC-41. This proved to be a complete loss. The batteries weren't adequate to provide the power sufficient to operate in an environment of this type when you are trying to control multiple aircraft at some distance. It wasn't until we got our C-108 in the valley and set up a standard TACP that we got satisfactory results. By the end of the fifth day, we had a completely normal operation and were controlling our own air sector, whereas the 3d Brigade never did take over their own air sector except at a distance using a FAC as a high airborne coordinator."*

Ironically, the TACP at A Luoi became involved in DELAWARE's only short round incident. On 3 May, the brigade was putting heavy ordnance into the "Punchbowl," a major enemy supply area in the A Shau. Since the ground commander wanted only heavy bombs, the light ordnance had to be dumped. At the dump site, the FAC saw Army gunships striking targets two kilometers to the north and assumed that was his target, since the TACP at A Luoi had confirmed there were no troops in the area. 96/

The FAC marked the target and, with imagined clearance from an Army helicopter in the area which apparently did not understand the FAC's intentions), he had an F100 drop its CBU-2. The basic responsibility rested with the FAC, who chose to mark a different target than directed. But his action

was based, in part, on erroneous information given him by the TACP. This unit was at its forward operating location to keep abreast of just such sudden troop movements as contributed to the short round incident. 97/

The Single Manager Concept for tac air was in effect for all of DELAWARE. Both Marine and Air Force fighter aircraft flew in the operation. For instance, on D-Day the sorties provided the 1st Cav were as follows: 98/

	Air Force	Marine
Preplanned	41	14
Immediate	10	22

The flexibility was apparent: preplanned sorties in support of Army troops came most frequently from Air Force resources, while immediates were more often Marine aircraft, since their resources were concentrated in I Corps and thus most quickly available.

The FACs were pleased with the job done by Air Force and Marine pilots and aircraft. The only significant adverse comment concerned the high level release altitude of the F-105s, which became available in DELAWARE due to the partial bombing pause in the North. Initially, the F-105 pilots used delivery techniques developed in the high density AAA environment of North Vietnam. (Thai-based aircraft had first conducted strikes in-country during Operation NIAGARA.) 99/ One FAC explained: 100/

> *"We experienced some problems with the F-105s. They were probably relatively new to Southern Vietnam. They were used to doing all their work in the high density anti-aircraft environment. We found they required an*

extreme ceiling to bomb from--almost all their deliveries are slicks--they release as high as 6,000 feet above the ground at high speeds, which jeopardizes their accuracy. BDA will reflect this... We got to the point where we had to watch them very critically."

This comment should be viewed in perspective. The FAC was naturally judging the F-105 pilots against the performance of in-country pilots who flew close air support missions nearly every day.

ARC LIGHT

Through 1967, only occasional ARC LIGHT missions were put into the valley and those were for general harassment and interdiction of Route 548.[101] The strikes went into the middle and southern parts of the valley. In 1968, the growing enemy infiltration produced a rapid increase in lucrative targets, especially north of A Luoi. In February, a block of seven missions hit the area between the future sites of LZ TIGER and LZ GOODMAN. During DELAWARE, several AAA guns were found in that area.[102]

ARC LIGHT strikes played a significant role in prepping the valley prior to D-Day, and in harassing the enemy during GRAND CANYON and early DELAWARE. For the eight days from 16 to 23 April, the A Shau Valley and Route 547 received 70 percent of all ARC LIGHT sorties in Southeast Asia.[103] Numerous secondary explosions and destroyed enemy positions later discovered by ground troops were testimonials of the effectiveness of this bombing.[104] (See Appendixes II and V.)

Judging by the locations of enemy positions found during DELAWARE, the

B-52 STRIKES AROUND A LUOI AIRFIELD
Figure 8

targets proposed by the Combined Intelligence Center Vietnam (CICV) and selected by MACV were well placed. This probably resulted from the requirements for extensive intelligence before the nomination of a target. Only a small number of the DELAWARE ARC LIGHT strikes were on CICV-nominated targets. 105/

As enemy facilities expanded in the valley and became more difficult to hide, the target nominations came from PCV and then from the 1st Cavalry and the 101st Airborne, subject always to III MAF approval. The PCV OPLAN for DELAWARE estimated "ten ARC LIGHT strikes available daily to support PCV operations throughout the Corps area for the period of operation." 106/ Further, from D-5 to D-1, A Shau would have priority on ARC LIGHT strikes in South Vietnam. There were 60 ARC LIGHT sorties available in SEA each day.

The OPLAN gave the following instructions:

- Strike targeting will attempt to hit known lucrative targets with three or four strikes in succession in order to capitalize on the destructive power of ARC LIGHT and prevent recovery by the enemy.
- Strikes will be concentrated against known troop locations, command and control, and AA/AW positions.
- CG, 1st Air Cav Div, will nominate five targets twice daily, NLT 1200 and 2400 hours, for nomination to III MAF.
- 101st Abn Div will nominate targets consisting of enemy strong points and concentrations which cannot be neutralized on a timely basis by tactical air or artillery.

Considering that only 60 ARC LIGHT sorties were available each day for all Southeast Asia, A Shau received a large number of strikes. From 24 March,

when the sustained harassment bombing began, to 10 May, when B-52 strikes were stopped in DELAWARE, the A Shau received 811 sorties* and more than 19,300 tons of bombs, 28 percent of the total dropped in the ARC LIGHT program during the period.[107] Especially concentrated were the strikes south of A Luoi around LZ Cecile and surrounding Ta Bat Airfield (LZ Lucy).

Scheduling so much ARC LIGHT produced some conflict with tac air also prepping the narrow 25-mile long valley. Several FACs complained about not receiving warning when a B-52 mission was ready to drop.[108] Said one FAC:

> *"B-52 strikes were one of our biggest hazards in the valley. Invariably, they would come in unannounced, without warning. They were, of course, working some of the same areas that we worked."*

The 1st Brigade ALO suggested that ARC LIGHT be restricted to night hours.[109]

Significantly, enemy AAA resistance was very light where ARC LIGHT strikes saturated the area, and heaviest where only one mission of six sorties was flown. The OPLAN specifically stated "strike targeting will attempt to hit known lucrative targets with three or four strikes in succession", and this was not done on LZ TIGER despite the 1/9th Cavalry's discovery of an AA/AW position with a weapon near the hilltop. Events on D-Day suggest that more ARC LIGHT on LZ TIGER was needed. However, few ARC LIGHT strikes were put on LZs VICKI, GOODMAN, and PEPPER and no crippling AAA was encountered.

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* This total differs from the 817 mentioned in the Introduction in support of GRAND CANYON, BUFFALO, and DELAWARE, because of different chronological boundaries and because some strikes within the DELAWARE AO were outside the A Shau Valley and Route 548.

The lesson to be learned, when conducting air-assaults into enemy territory in South Vietnam, is detailed attention must be paid to suppressing AAA. Recognition should also be given to just how good enemy AAA equipment and tactics have become. In a dense jungle environment, the inability of electronic and helicopter reconnaissance to discover all AAA is reason enough to suspect that such weapons may be around. Thus, with an air assault imminent, ARC LIGHT should be used as it was on TIGER and VICKI, in a tactical air role, and several missions should saturate the proposed LZ locale to destroy possible AAA sites.

Airlift into A Luoi

The importance of airlift to the 1st Cavalry's operations in the A Shau was apparent in the careful timetable written into the division's DELAWARE OPLAN 5-68. On D+2, the 1st Brigade was to seize A Luoi Airfield and be ready the next day to accept Flying Crane delivery of earth moving equipment. On D+5, the airfield would be open to C-7s and the next day to C-123s. At the same time, a three-day stock level of all classes of supplies would be put into A Luoi, at a rate of 225 tons per day from D+3 to D+8. After that, drops would be used only for emergency resupply.

From the beginning, this tight schedule could not be maintained. A Luoi was not occupied until D+6, four days behind schedule, and then more bad weather hampered the movement of the engineering equipment needed to restore the long abandoned strip. For instance, the Flying Cranes, lifting heavy equipment, had to be refueled in flight from Camp Evans to A Shau and poor weather plagued the rendezvous point. [110] Only by D+10 could the Army

engineers begin heavy repairs, such as filling in the several 20-foot deep ARC LIGHT craters.[111] They completed the job within the two-day period projected by the OPLAN.[112] On 2 May, a C-7 landed at A Luoi--the first Air Force fixed-wing aircraft to land in the valley since Maj. Bernard F. Fisher of the 1st Air Commando Squadron at Pleiku, briefly touched down his A-1E at A Shau in March 1966.

Unlike air-land missions, the cargo drops flew on schedule, beginning the morning after A Luoi was secured. The Tactical Airlift Liaison Officer (TALO) for the division went in with the initial assault to establish the drop zone.[113] He described the events of the morning of 26 April:

> *"At about 0830 the first aircraft called over Point Bravo, a radial off Phu Bai on a DME fix, and the combat control team cleared him in. We advised him the weather was very poor, about 500 feet overcast. Once he left Point Bravo, the only aids he had were what were in the aircraft. In other words, there was no GCA, no ADF, no navigation aids whatsoever on the ground to help him.*
>
> *"He entered the weather at about 8,000 feet. He had to navigate his way through the weather into the A Shau Valley, find the valley, make a turn parallel to the valley up toward the airstrip, meanwhile keeping his bearing to avoid the mountains lining both sides of the valley, some going up maybe 2,000 feet above the valley floor.*
>
> *"On the ground we heard the first airplane leave Bravo, call on final approach, and at about one half to three quarters of a mile from the drop zone at an altitude of 500 feet above the valley floor he reported that he saw the drop panels. His normal drop altitude was 700 feet, so he actually dropped down lower than planned before he could break out. When he made this transmission we saw him breaking in and out of the clouds. He had only a few seconds to line up on the drop panels and he performed his drop, which is a zoom up maneuver. In other words, he adds power, pulls the nose up, releases his extraction chute, cuts the load free, and the force of the aircraft moving out drops the load out.*

CARGO DROP NEAR A LUOI GCA UNIT
Figure 9

"All this was taking place in weather; we didn't see it. We saw the airplane disappear at 500 feet and we saw the cargo come out. It was a fantastic job. He circled on out and number two man holding at Point Bravo asked him how the weather was. He said, 'It's kind of sticky but you can press right on through.' That was the attitude of the flight crews: it may be bad but it's not impossible. It was really imperative, especially in the first two days that the C130s could get through. Nothing else could make it into the valley--no other aircraft, no other forms of supplies. Helicopters weren't flying, there weren't any road supplies, the troops on the ground were very low on supplies, very low on ammunition, very low on water."

That day and the next, the C-130s continued dropping cargo despite the bad weather. The OPLAN called for six days of 225 tons dropped daily; the airlift actually put in an average of 238 tons for nine days (including more than 90 tons daily of combat essential emergency cargo).[114/] This professionalism in the face of weather that would have justified not making the drops caused the 1st Cavalry's Commanding General, who was at A Luoi during the first drops, to tell the Commander, Seventh Air Force:[115/]

"...on 26 and 27 April in the A Shau Valley, I witnessed your C-130 crews in one of the most magnificent displays of courage and airmanship that I have ever seen....I strongly recommend that suitable awards for valour be presented to each member of the crews involved. It was just a fantastic and inspiring demonstration of real cooperation in getting the job done."

Although the extraordinary effort required of the C-130 pilots would appear to belie it, precise plans were coordinated between the 1st Cavalry and airlift personnel to counter bad weather. The Army's tactical GCA unit had a high priority to go into A Luoi on the first day, but it never got beyond being loaded onto a helicopter. The TALO commented:[116/]

[redacted]

"However, for some reason the GCA was not airlifted to the strip. They loaded it on a helicopter and missed it by one or two rides. It was probably one of the first helicopters that couldn't make it in. They just waited too long and it sat there for three days while they couldn't get the GCA unit in. It wasn't that they weren't planning on bad weather, but they just slipped up on the logistical system. Once they got the GCA unit in--once the weather broke--they got the GCA unit operational in a day." (Fig. 9.)

On 4 May, the last cargo drop was made and C-130s and C-123s landed on the dirt strip. Having prepared the runway, the engineers then enlarged the turnaround areas. The airstrip received 639 tons of cargo in addition to 2,246 tons airdropped. Cumulative results were:[117/]

		Cargo In		Cargo Out	
	Sorties	Drop	Land	Tons	PAX
C-7	29	0	61.7	2.5	0
C-123	27	0	117.7	0	0
C-130	214	2,245.7	460.0	202.5	568
TOTAL	270	2,245.7	639.4	205.0	568

This was done at a cost of one C-130 destroyed and eight men killed on 26 April, probably shot down by 37-mm fire, while approaching A Luoi under a low cloud cover.[118/]

DELAWARE Appraised

Operation DELAWARE was a significant ground operation in the 1968 interdiction campaign. It aimed more at destroying enemy supplies than enemy troops, as recorded in Appendix I. Other official statistics were:[119/]

[redacted]

[redacted]

	DELAWARE (U.S.) (19 Apr-17 May)	LAM SON 216 (ARVN) (19 Apr-12 May)
Friendly	142 KIA 846 WIA 30 MIA	26 KIA 132 WIA
Enemy	739 KIA 6 Det	130 KIA 2 Det
Small-Arms Cptrd	2503	60
Crew-Served Cptrd	59	6

The importance of airpower in DELAWARE was revealed by weather, which imparted a stop-and-go aspect to the operation. When air was weathered out, schedules lagged: The initial reconnaissance on 13-14 April, the standstill for two days after the assault into LZ TIGER, and the delays in opening A Luoi Airfield. When the weather improved, the operation went into high gear: The three-day VR period, the five days from 22-26 April, when four LZs were opened and heavy artillery was helilifted in, and the first week in May, when the enemy "Punchbowl" was overrun after several days of heavy bombing by tac air.

Cumulative strike sortie totals and BDAs for all DELAWARE, except LAM SON 216, were:[120/]

	7AF	SAC	USN/USMC	TOTAL
Strike Sorties	1,208	442	1,316	2,966
Secondary Explosions	107	97	63	267
Secondary Fires	18	0	20	38
Killed by Air	59	0	24	83
Road Cuts	13	0	0	13

[redacted]

[redacted]

	7AF	SAC	USN/USMC	TOTAL
Trucks (Dest/Dam)	4/0	0		13/5
Gun Positions (D/D)	11/0	0	13/0	24/0
Bunkers (D/D)	173/13	0	235/36	408/49
Tracked Vehicles (D/D)	1/0	0	1/0	2/0
Bridges (D/D)	1/0	0	0	1/0

The following aircraft were destroyed while supporting DELAWARE: 121/

USAF	USMC	U.S. Army *
1 O-2	2 A-4	20 Helicopters
1 C-130		

Problems and successes in the use of airpower in DELAWARE are summarized:

- Not as many 2,000 and 3,000-pound bombs were available as desired to blast LZs in thick jungle. This was especially troublesome when low cloud ceilings hampered salvo drops of smaller ordnance, causing greater dispersion rates and lessening explosive effectiveness.
- F-105 pilots out of Thailand were accustomed to out-country high-delivery patterns, which were not desirable for supporting troops-in-contact in-country.
- Communications between the A Shau Valley and Phu Bai/Camp Evans were a problem. The Army solution was to establish Signal Hill; the Air Force employed a FAC relay. The Air Force's use of a high FAC facilitated communication relays

* Many more brought down by groundfire sustained varying degrees of damage, but were later recovered and repaired.

[redacted]

[redacted]

and also provided an air traffic monitor who funneled fighters into the low FAC. The high FAC also warned the low FACs when the working areas for fighters began to overlap and threaten safety.

- Movement of Air Force support personnel and equipment with their Army units into A Shau was a mixed success. The 1st Brigade TACP moved on the first day with the brigade, but the 3d Brigade TACP and the division GCA unit did not move as scheduled. In the case of the GCA unit, the Army's failure to accomplish the scheduled airlift had to be compensated by extraordinary flying by C-130 pilots.

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- Lack of adequate warning of impending ARC LIGHT strikes plagued A Shau operations and nearly destroyed an O-2 and pilot. Sometimes the warning came over the guard channel after the B-52 strike.

- The 1/9th Cavalry squadron used a 7AF target list when it began prepping the A Shau Valley. After the first day, the squadron considered "reconnaissance by fire" more effective. That tactic relied partly on the enemy revealing his gun positions by firing on the helicopters, and often the enemy refused to fire.

- Enemy AAA in the A Shau Valley was dense enough to inflict on the 1st Cavalry Division the heaviest one-day helicopter losses of the war to date.

An overall evaluation of DELWARE suggests that the operation was well-conceived and, on the whole, well-implemented. Weather and the mountain jungle environment helped many enemy to escape, but large amounts of stores were captured or destroyed, including twelve 37-mm guns. The latter fact reemphasizes the improving enemy in-country AAA capability. The quantity

[redacted]

and quality of enemy equipment and supplies showed the compelling need for a coordinated in-country air interdiction campaign. The continuing need for such a campaign was evident from the amount of supplies reaching the enemy troops in I Corps. Troops on the ground were decisive in their effectiveness, but only while they were there. The in-country intelligence section of Seventh Air Force put the problem in sharp perspective in an evaluation of Operation DELAWARE.[122/]

> *"Captured documents have provided a fairly detailed sketch of the enemy's transportation capability through the A Shau Valley and some insight into the effectiveness of our operation against his. The documents showed that the enemy is able to transport vast quantities of supplies through the valley, and that the only completely effective interdiction program for Route 548 is to occupy the valley with ground forces. Airpower has been able to hinder the flow of materiel significantly, but flow continues at a rate more than sufficient to supply the enemy's needs in northern I Corps."*

FOOTNOTES

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118. (C) Interview, Capt Robert F. Muller, Doc. 18.

119. (C) Msg, MACV, OPREP 5, Weekly Summary (11-18 May 68), 20 May 68.

120. (C) Msg, DIS, 7AF to CINCPACAF, DI, CINCPACAF, "Daily LOC Intel Summary", 190600Z May 68, Doc. 29.

121. (C) Msg, DIS, 7AF to DI, CINCPACAF;
Msg, 20 TASS, Da Nang to CINCPAC et al, subj: Aircraft Loss, 030945Z May 68, Doc. 30.

122. (SNF) WAIS, DIP, 7AF, "Operation DELAWARE", 1 Jun 68, pp. 3-6, Doc. 31.

APPENDIX I

CAPTURED SUPPLIES AND EQUIPMENT
Operation DELAWARE/LAM SON 216

WEAPONS

PISTOLS:	
9-mm	1
Chicom type	1
RIFLES:	
French bolt action	210
Chicom bolt action	404
M-16 (US)	10
AK47 (7.62-mm assault)	95
K-44 (sniper)	1,271
Carbines (M-1 & M-2)	4
SKS (USSR-7.62-mm carbine)	40
SHOTGUNS: 12 gauge	1
MACHINE GUNS:	
9-mm (sub)	29
DPM (7.62-mm light) (USSR)	2
RPD (7.62-mm light)	11
M-60 (US)	5
.50 caliber (US)	3
7.62-mm (heavy)	2
12.7-mm (heavy)	5

FLAME THROWERS:	31
CANNONS: 20-mm	3
RECOILLESS RIFLES:	
57-mm	2
75-mm	8
90-mm	1
RECOILLESS ANTI-TANK LAUNCHERS:	
RPG-2 (82-mm) (B-40)	8
RPG-7 (80-mm) (B-41)	2
ANTIAIRCRAFT GUNS: 37-mm	12
MORTAR TUBES	
60-mm	8
81-mm	1
82-mm	3
ROCKET LAUNCHERS: 122-m	1
GUNS: 85-mm	1

AMMUNITION

SMALL ARMS:	154,710
MACHINE GUN:	
.30 caliber	3,027
.50 caliber	21,400
12.7-mm	30,015
CANNON: 20-mm	240
ANTIAIRCRAFT:	
23-mm	62,096
37-mm	17,955

RECOILLESS RIFLE:	
57-mm	750
75-mm	126
90-mm	3
RPG RECOILLESS ANTI-TANK:	217
MORTAR	
60-mm	582
81-mm	9
82-mm	852
120-mm (CHICOM)	9

GRENADES:	3,003
MINES:	35

DEMOLITION ITEMS:

Explosives (lbs)	4,148
Time fuses (ft)	31,000
Pull-type fuses (cases)	123
Blasting caps	8,469

MISC SMALL ARMS, MINES, AND GRENADES: (tons)	3

ROCKET:

122-mm	51
140-mm	8

ARTILLERY:

75-mm	311
76-mm	845
85-mm	159
122-mm	866

MEDICAL ITEMS

Medical supplies, including sulfa and penicillin (Lbs)	1,300
First aid kits	20
Streptomycin (btls)	100
Microscopes	2

ELECTRICAL GEAR

ELECTRICAL ITEMS:

Transformer	1
Generator	1
Electrical motor	1
Electric fan	1
Insulators (cases)	21
Three-strand wire	1,200m
Commo wire	1,300m
Copper wire (20 coils) +	1,200m

MISC ELECTRONIC GEAR:

Tape recorders	2
Field phones	3
Oscilloscope	1
Technical books in Russian, Chinese and Vietnamese (lbs)	15

RADIO ITEMS:

Military radios	6
Transmitter-receiver	1
Amplifier	1
Radio control set (USSR)	1
Large antenna	1
Antenna kit and hand cranked generator	1
Transmitter coils	18
Radio parts (boxes)	10
Manuals in Russian and Vietnamese	1
Notebook of radio notes	1

MINE DETECTORS: 36

WHEELED VEHICLES ITEMS

VEHICLES:

Jeep	1
Trucks (misc)	38
1 1/2 ton trucks (USSR)	12
1 1/4 ton trucks (USSR)	15
2 1/2 ton truck (US) (GMC)	1

PARTS:

Radiators	54
Batteries	6
Starters	5
Carburetors	100
Coils	15
Flywheels	6

EQUIPMENT: hydraulic jacks	3	Generators	5
		Pistons	20
MAJOR ITEMS:		Brake shoes	200
Large gasoline engines	2	Ignition parts (boxes)	2
Truck transmission	1	Clutch plates	20
Truck rear end	1	Misc truck parts (cases)	15

TRACKED VEHICLE ITEMS

PT-76 tank (amphibious USSR)	1	Enough track parts to fabricate tracks for 7 vehicles	
Bulldozers	2	Enough spare rubber tread blocks replace on 20 vehicles	
Guide wheels for tracked vehicles	115		
Tracked vehicles (misc)	3		

FOODSTUFFS

Rice (Lbs)	71,205	Meat (boxes)	22
Salt (Lbs)	100	Canned meat (cases)	60
Assorted foods (lbs) (29 cases)	500	Beef bouillon (qts)	10
Preserves (cases)	11	Pork and beef (CHICOM) (qts)	1,125

MISCELLANEOUS ITEMS

Barbed wire (rolls)	30	Pick, shovels, rakes, etc.	1,000
Propaganda films	2	Gas mask filters	50
Propaganda tape	1	Gas detector kit	1
Plastic waterproofing (cases)	20	Petroleum products (gal)	9,282
Soap (bars)	800	Grease (gal)	620
Toothpaste (tubes)	600	Gas masks	257

SUMMARY OF RESUPPLY TONNAGES:

	AIR DROPPED	AIR LANDED	HELICOPTER	HIGHWAY	TOTAL
1st Air Cav Div	2,212	647	2,315	-----	5,174
101st Abn Div	-----	---	1,984	2,069	4,053

CASUALTIES:	KIA	WIA-EVAC	POW	RETURNEES	HELICOPTER LOSSES
Friendly	139	662	-	---	20
Enemy	726		5	7	

SOURCE: Press Briefing, "Captured Supplies and Equipment, Operation DELAWARE/ LAM SON 216," PCV Hq, 17 May 1968.

APPENDIX II

Final Results of GRAND CANYON and BUFFALO .
(1-18 April 1968)

GRAND CANYON

	7AF	SAC	USN/USMC	TOTAL
Strike Sorties	187	300	40	527
Secondary Explosions	8	64	4	76
Secondary Fires	3		1	4
Killed by Air	0		3	3
Road Cuts	16		6	22
Trucks (Dest/Dam)	2/0		1/0	3/0
Gun Positions (D/D)	5/1		0/2	5/3
Bunkers (D/D)	3/0		15/0	18/0

BUFFALO

	7AF	SAC	USN/USMC	TOTAL
Strike Sorties	215	75	26	316
Secondary Explosions	4	3	1	8
Secondary Fires	0		2	2
Killed by Air	17		0	17
Road Cuts	70		6	76
Trucks (Dest/Dam)	7/0		1/0	8/0
Gun Positions (D/D)	3/0		0/0	3/0
Bunkers (D/D)	6/4		0/0	6/4
Bridges (D/D)	1/0		0/0	1/0

SOURCE: Msg, DIS, 7AF to DI, PACAF, LOC Intel Summary of Results through 1600Z 23 Apr 68, 24 Apr 68.

APPENDIX III

AAA in SVN

Since late 1965, the emphasis in the study of AAA in SEA has been directed toward the Out-Country war. This is understandable since North Vietnam has the heaviest concentration of antiaircraft artillery known in any part of the world. Over 5,500 weapons (one AA gun for every nine square miles) are employed in NVN.

Intelligence sources indicate that an increasing number of weapons are being infiltrated into South Vietnam for use in the AA role. Encounters with small arms and heavy machine guns continue, particularly those in the 7.62, 12.7 and 14.5mm range. Reconnaissance photographs reveal the enemy is upgrading his air defense capability in SVN with 37 and 57mm weapons. On 24 March 1968, Project Delta forces discovered over 3,000 rounds of 23mm AAA ammunition, 21 kilometers southwest of Hue. Also, strike aircraft in the vicinity of YD683087 received air bursting ground fire which Delta Forces described as 37mm exploding at 8,000 feet. The large number of rounds fired at the aircraft, between 50 and 75, the discovery of 23mm ammunition, and PW interrogation, confirm the existence of lethal antiaircraft weapons in SVN. On 18 March, reconnaissance photographs revealed two 57mm AAA weapons near Route 9, 16 kilometers west-southwest of the Khe Sanh Combat Base.

Before the capabilities of these weapons are discussed, it is necessary to examine the role that these weapons play in relation to the air mission in South Vietnam. The enemy undoubtedly will attempt to increase his AAA capability for the following reasons: (1) The relatively good kill capability against slow flying reconnaissance fixed and rotary wing, and drone aircraft; (2) the deterrent effect on modern, high-speed, low-level, attacking aircraft causing ordnance to impact off target; (3) the beneficial effect on the morale of troops under air attack.

In addition to the weapons mentioned above, the German 7.92mm machine gun, Soviet SG-43/SGM and RP-46 heavy machine guns, and the U.S. 50 caliber antiaircraft machine gun are presently in use in South Vietnam. The German 7.92mm machine gun (MG-34) was developed to serve as a heavy machine gun, however, it has characteristics of a light machine gun. This is accomplished by use of a quick change barrel and a special metallic link belt. These characteristics, plus a 250 round box magazine and a cyclic rate of fire of 800-900 rounds per minute, enhances the antiaircraft capability of this weapon. A special AA mount has been fabricated and a speed ring sight has also been featured. Trajectory charts are comparable to the Soviet 7.62mm heavy machine gun or the U.S. 30 caliber.

The Soviet SG-43/SGM and RP-46 heavy machine guns and their ChiCom copies are found in considerable quantity in South Vietnam. Primarily designed as close support infantry weapons and base of fire for heavy weapons units, they

(This page is CONFIDENTIAL.)

APPENDIX V

ARC LIGHT SORTIES

Date	A Shau-Rt 547	I Corps	Total SEA
Mar 20	3	33	54
21	0	30	66
22	0	6	60
23	0	45	60
24	5	45	60
25	6	56	60
26	6	42	56
27	18	53	66
28	18	53	60
29	18	53	60
30	0	48	60
31	6	57	60
Apr 1	6	43	60
2	0	54	60
3	18	54	60
4	11	47	60
5	12	30	60
6	30	39	60
7	42	60	60
8	24	51	60
9	18	18	54
10	21	33	60
11	18	18	66
12	12	20	54
13	6	15	60
14	18	24	60
15	0	0	54
16	38	59	66
17	54	54	60
18	48	48	60
19	29	29	60
20	45	45	60
21	42	54	60
22	48	48	60
23	40	40	66
24	12	20	54
25	24	24	60
26	28	28	58
Apr 27	6	30	60
28	6	33	60
29	0	12	60
30	0	0	60
May 1	6	12	60
2	18	18	60
3	6	12	60
4	12	12	60
5	0	6	60
6	6	6	60
7	12	12	60
8	6	6	60
9	0	0	65
10	12	12	54
11	0	42	66
12	0	18	54
13	0	66	66
14	0	6	60
15	0	12	54
16	0	0	66
17	0	6	54
18	0	12	66
19	0	18	60
20	0	2	60
21	0	0	60
22	0	6	54
23	0	6	66
24	0	0	60
25	0	0	54
26	0	9	66
27	0	0	54
28	0	36	66
29	0	6	54
30	0	12	66
31	0	18	60

SOURCE: Working Papers, ARC LIGHT Daily Ordnance Dropped, ARC LIGHT, TACC, 7AF, 18 Jun 68.

APPENDIX VI

COMMENDATION OF C-130 AIRCREWS
FROM
COMMANDING GENERAL, 1ST AIR CAVALRY DIVISION*

"On 26 and 27 April in the A Shau Valley, I witnessed your C-130 crews in one of the most magnificent displays of courage and airmanship that I have ever seen.

"The low ceilings, mountainous terrain, lack of terminal navigation facilities and enemy anti-aircraft fire all combined to create an exceedingly hazardous environment for the planned resupply airdrops.

"To the crews who accomplished all of the scheduled airdrops on those two days go the sincere thanks and admiration of all the skytroopers of the first team.

"I strongly recommend that suitable awards for valour be presented to each member of the crews involved. It was just a fantastic and inspiring demonstration of real cooperation in getting the job done."

* Excerpt, Letter of Commendation to 834th Air Div by Comdr, 7AF, 9 May 68.

APPENDIX VII

COMMENDATION OF 834th AIR DIVISION PERSONNEL
FROM
COMMANDING GENERAL, PROVISIONAL CORPS, VIETNAM, PHU BAI*

"17 May 1968 witnessed termination of Operation DELAWARE, one of the most audacious, skillfully executed and successful combat undertakings of the Vietnam war. In concept DELAWARE entailed reconnaissance in force into the A Shau Valley to determine the extent of enemy activities and facilities, disrupt enemy logistic operations and capture or destroy maximum amounts of weapons, equipment, and supplies. The tactical air contribution in terms of C-7A, C-123, and C-130 support reflected not only outstanding proficiency, but another instance of timely and unfailing support of ground forces regardless of operational difficulties and danger. To all participants in Operation DELAWARE, convey my warmest congratulations, praise and admiration for outstanding combat accomplishment."

* Excerpt, Letter of Commendation to 2APG et al, by Brig Gen Burl W. McLaughlin, Comdr, 834th Air Div (PACAF), 6 Jun 68.

GLOSSARY

AAA	Antiaircraft Artillery
AA/AW	Antiaircraft/Automatic Weapons
AO	Area of Operation
ARVN	Army of Republic of Vietnam
BDA	Bomb Damage Assessment
CICV	Combined Intelligence Center Vietnam
COMUSMACV	Commander, U.S. Military Assistance Command, Vietnam
CP	Command Post
DASC	Direct Air Support Center
DMZ	Demilitarized Zone
FAC	Forward Air Controller
FM	Frequency Modulation
FSB	Fire Support Base
GCA	Ground Controlled Approach
LOC	Line of Communication
LZ	Landing Zone
MACV	Military Assistance Command, Vietnam
MAF	Marine Amphibious Force
mm	millimeter
NVA	North Vietnamese Army
OPCON	Operational Control
OPLAN	Operations Plan
PCV	Provisional Corps Vietnam
SSZ	Specified Strike Zone
TACC	Tactical Air Control Center
TACP	Tactical Air Control Party
TALO	Tactical Air Liaison Officer
TASE	Tactical Air Support Element
TOC	Tactical Operations Center
VR	Visual Reconnaissance