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After hearing Lt Col Soulang's report, one high ranking Laotian military official, General Boun Pone, CG Tactique Sud, reportedly said that after what happened to BV-33 that the Laotian Forces Armees Royale "must consider South Vietnamese as enemy because of their conduct". He pointed out, however, that he was not too concerned with "what happened in the past", but rather "more interested in getting back as many refugees and BV-33 personnel as possible". Many evading members of BV-33 did eventually make their way back to friendly lines and were able to make contact with American agents in Laos. ^{83/} Others were not so fortunate. Many of the refugees were either killed by NVN forces or pressed into portering service for the enemy. ^{84/}

The Covey FACs observed the refugees on several occasions moving at various points between Khe Sanh and the Laotian border. On 8 February, Covey 252 was over Khe Sanh at approximately 0745 hours. He was advised by the Khe Sanh control agency that "people were walking from east to west", from Khe Sanh City toward Lang Ve. There were several hundred of them in small groups along the road, and the Marines were "seriously considering" directing artillery fire against them. Fortunately, Covey 252 suggested that he first take a closer look at these people. He was able to identify them as refugees, and they were not fired upon. ^{85/}

Heavy refugee movement continued on Route 9 over the next few days, and on several occasions the Covey FACs were able to make confirmation of the noncombatant role of these persons--thereby precluding the

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inadvertent direction of friendly fire against them. Unfortunately, the continued safety of the refugees could not be assured. It soon became obvious that many of them had not reached safety, but had been pressed into service by the NVA forces. A definite change in the pattern of movement on Route 9 was detected. Rather than walking in one direction towards Laos, the refugees were observed moving back and forth on the road; NVA soldiers were intermingled with them. The presence of the NVA soldiers presented a dilemma.^{86/}

It was obvious to the Covey FACs that the enemy forces were now using the refugees for portage, as well as cover for continued military infiltration. The FACs still considered these groups of persons to be noncombatants, which obviated their being considered as a military target. Conversely, the Marine control agency at Khe Sanh advised the Coveys that the presence of NVA soldiers among these people represented a real threat to the security of Khe Sanh, and if these circumstances were allowed, the Route 9 situation could grow considerably worse. Thus, the Marine control agency made the decision to direct fire into the area. Several secondary explosions on the road confirmed the presence of military stores. This regrettable situation was considered a personal tragedy by many of the FACs. Before the Elephant camp had fallen, the Coveys had often flown into the camp and had become friends with the camp commander and his people. The FACs' families in the United States had often sent gifts of clothing for distribution among the Laotian dependents.^{87/}

After the fall of Lang Vei, it appeared even more likely that an

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enemy assault against Khe Sanh was forthcoming. A COMUSMACV assessment on 10 February said: "Attacks by elements of up to six regiments are probable against Khe Sanh. These attacks can be supported by artillery, rockets, mortars, and a few armored vehicles. Interrogation of returnees indicates attacks throughout the DMZ will be supported by tanks and aircraft. The recent use of tanks at Lang Vei indicates the enemy may introduce new equipment and tactics to support offensive activity in I Corps." ^{88/}

A 7AF Intelligence Report advised: "It appeared at first as if the attack on Lang Vei might be the first of a series of assaults along Route 9. Now the situation is unclear. The enemy has delayed considerably in following up his success at Lang Vei with an attack on Khe Sanh. There have been several vigorous attacks against the high ground to the north of Khe Sanh, particularly Hill 861. It is possible that the enemy is reluctant to undertake to overrun Khe Sanh without first securing the high ground around it." ^{89/}

Attack Against Hill 861

Marine outposts around Khe Sanh were subjected to continuous harassment from enemy mortar fire and ground probes. One of the more significant ground attacks was made on 8 February against an outpost on Hill 861 immediately north of Khe Sanh. Just prior to this attack, Covey 251 and Covey 252 had arrived in the area at approximately 0745 hours, had checked in with the ABCCC, and were reconnoitering refugee movements on Route 9. ^{90/}

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In response to a request from the Marine control agency at Khe Sanh, the FACs moved away from Route 9 to direct strikes against mortar and rocket positions on a ridgeline approximately one kilometer from the Khe Sanh runway. Canasta 403, a flight of four Navy A-1Hs, were on station with Mk-81s, Mk-82s, and 20-mm. The Coveys directed the Canasta flight on one bombing run against the ridge, received one secondary explosion, and then "held them high" when Khe Sanh radioed that they had lost contact with the outpost on Hill 861 ^{91/}

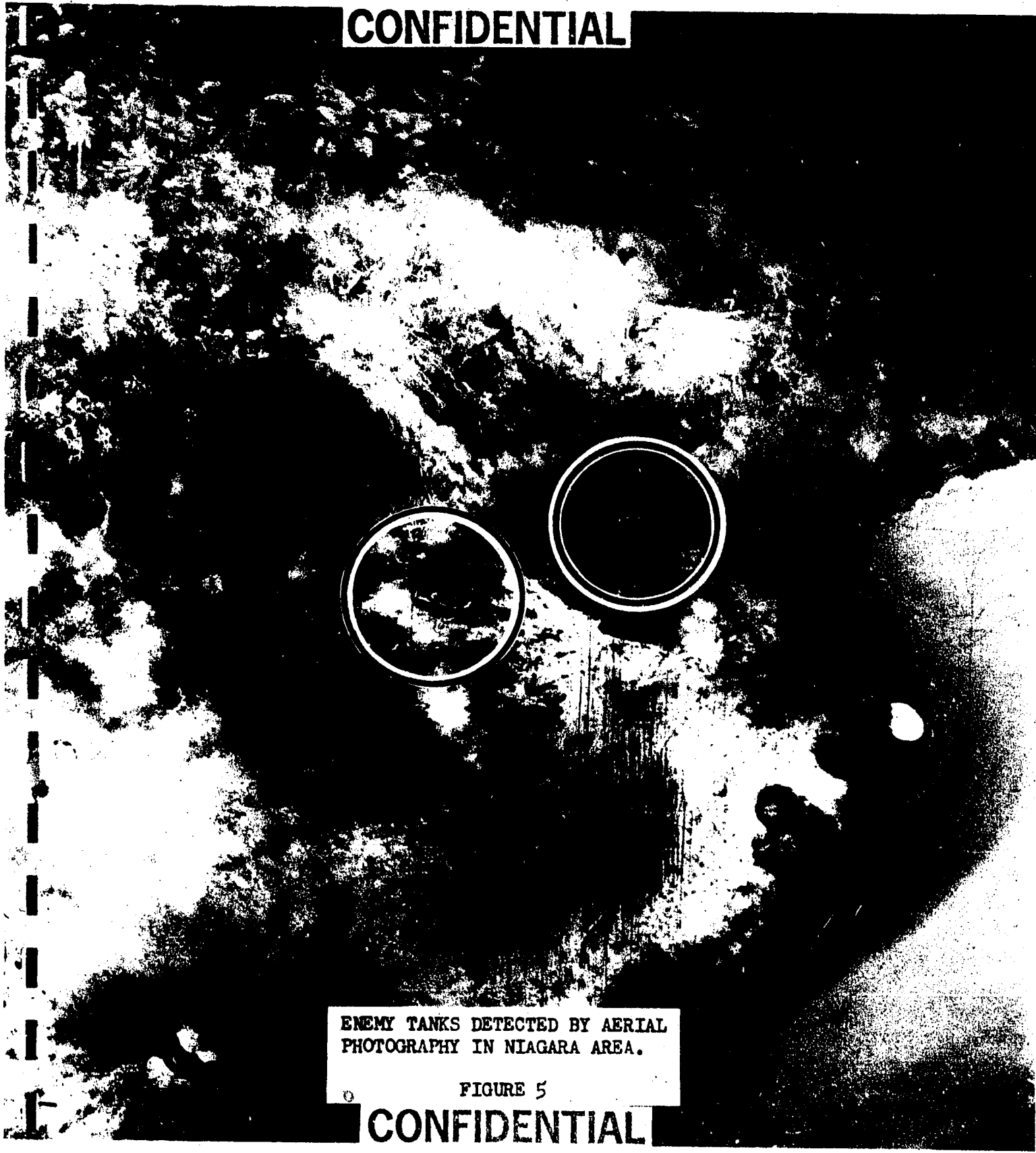
Covey 252 received the outpost coordinates from Khe Sanh, and immediately flew over the area. He first observed several men huddled in trenches. ^{92/} The FAC recalled:

"I couldn't really tell whether they were friendly or enemy troops, because the color of the uniforms all looked the same. They looked like our people, but there was always the possibility that our people had been overrun and were attempting to regain their positions. As remote as this was, it was still a possibility, and it prevented us from making immediate strikes."

Khe Sanh control finally gave clearance for the FACs to direct strafing and bomb runs on the northwest base of the hill which was in defilade from Khe Sanh's suppressive fire. According to the FAC, the suppressive fire from Khe Sanh was effective except for the backside of the hill, where the enemy were actually located. The FAC described the Canasta 403 strikes: ^{93/}

"They did a fantastic job of placing their bombs and strafing passes right up the hill toward the outpost. While attacking, they would suppress the NVA fire, but as soon as I would hold them off, to survey our effectiveness,

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ENEMY TANKS DETECTED BY AERIAL
PHOTOGRAPHY IN NIAGARA AREA.

FIGURE 5

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the attack would resume. We then requested Spooky and some A-4s. We wanted napalm, CBU, and rockets.

"We wanted any propeller driven aircraft available, to remain close to the target at low altitudes. In our opinion the outpost was in the process of being overrun, and if we didn't get air, it would be."

As reported by Hillsboro, the weather was unworkable for jets, and the proximity of friendly troops prevented Sky Spot directed strikes. Task Force Alpha at Nakhon Phanom AB, Thailand immediately scrambled a flight of three A-26s, call signs Nimrod 32A, 34A, and 35A, to aid the outpost. Three T-28 "Zorros" from Nakhon Phanom were already airborne on armed reconnaissance in the STEEL TIGER area, and these were immediately diverted into NIAGARA by the ABCCC. Both the Zorros and the Nimrods arrived in time to repulse the attack. The Zorros were credited with 5 KBA confirmed, and the Nimrods with 45 KBA confirmed. ^{94/} The FAC reported on their effectiveness: ^{95/}

"Both flights were extremely effective. The A-26s just about saved the situation immediately with their area coverage, their strafing passes, their napalm, etc. When the Nimrods completed their passes, the attack was suppressed--enough so that the men in the outpost could stand up and walk off the hill without receiving fire. Apparently, they were in the process of evacuating the outpost at the time. APCs from Khe Sanh had arrived, and they were actually leaving the outpost. However, when the firing ceased, they decided to return to the hill. They went over the hill, captured several crew served weapons and small arms, and counted over 50 enemy KBA."

Targeting and Tactical Response

When the 8 February attack against Hill 861 was repulsed, the

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enemy buildup in the Khe Sanh area had already reached its peak; however, no major ground engagement followed. Ground contact beyond the covering fires of the camp perimeter did continue, and attacks by fire against Khe Sanh became continuous ^{96/} That enemy forces in the area still represented a major threat was made clear on 23 February when the Khe Sanh area reportedly received 1,000 rounds of artillery, mortar, and rocket fire in one five hour period ^{97/} Concomitantly, the sustained air effort continued at a high level. ^{98/}

Equally as unprecedented as the sustained strike effort in the NIAGARA area was the intensive and carefully managed reconnaissance targeting cycle that made an effective round-the-clock air offensive possible ^{99/} Within 40 hours after the 7AF Commander was tasked by COMUSMACV to initiate NIAGARA II SLAM operations on 31 January, a NIAGARA Intelligence Control Center was activated by the 7AF DCS/Intelligence and began generating sufficient tactical targets from an all source data base to assign specific objectives for the entire force. All out-country intelligence programs, except essential ones, were halted to maintain this special capability. ^{100/}

The primary objective of this task force was defined as follows: ^{101/}

"... to locate, identify, confirm and nominate for attack tactical targets in the NIAGARA area, assess the effects of attacks against these targets and determine reattack requirements."

Many targets were visually acquired and struck. Reports of these strikes, added to other FAC sightings, provided a valuable input to the

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NIAGARA Control Center. The Control Center in turn, provided a current and complete picture of known enemy dispositions around Khe Sanh. Effective application of the total air effort depended on the validity of that "picture." The defense of Khe Sanh became, to this extent, dependent on the generation of valid targets in Saigon, 375 miles away. Tan Son Nhut Air Base, with its photo processing and exploitation, and array of supporting intelligence capabilities, became the source of air targeting data for the entire effort. Later debriefing of the Officer in Charge (OIC) of the Regimental Fire Support Center revealed that NIAGARA Control's Hot Item Reports and nightly computer runs were employed in laying on artillery and Marine close-in air support as well. ^{102/}

A variety of resources were exploited to build the target data base. One primary source was the Human Intelligence (HUMINT) collection program-- interrogation of POWs and other local sources. Some of the earliest definitive information on enemy plans for Khe Sanh came from human source intelligence. From 22 January through 31 March, an Air Force interrogation team based at DaNang submitted approximately 100 special reports responsive to 7AF, MACV and PACAF requirements. One of the first examples covered the interrogation on 19 January of an NVA First Lieutenant. He provided the DaNang team with information on the enemy's offensive planning. He reported plans for a division-sized attack against Khe Sanh, the movement of tanks into the DMZ area for employment in SVN, and plans for attacks on other Marine DMZ positions. Reports of this kind were passed directly to NIAGARA ICC, where an all-source effort was operative to translate them into air targets. Reported bivouac areas, supply points and command posts,

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once plotted on maps, were researched in photography. Often, new reconnaissance was flown to exploit HUMINT data.^{103/}

A variety of specialized sensors, combining electronic, seismic and acoustic techniques, also provided inputs. The information was necessarily fragmentary--the precise location and nature of the types of activity detected required skilled interpretation or more often, educated guesswork. The unique value of the sensors was that they operated 24-hours a day throughout the enemy occupied area.^{104/}

Each intelligence source in its own way penetrated the tree and cloud cover which so often frustrated photo reconnaissance. The full value of the entire range of intelligence sources and special sensors was realized in NIAGARA under the impact of an intensive all-source intelligence effort. Separate inputs acquired increasing value as they were combined with other data, adding together to define new targets.^{105/}

Eventually, all target data was reduced to precise locations identified on photography. Target folders were then prepared for FACs and strike crews, and accurate eight-digit UTM coordinates provided for Arc Light and artillery use.^{106/}

The amount of aerial reconnaissance flown during Operation NIAGARA almost doubled the film footage normally processed by 7AF facilities. As the workload passed 100,000 feet of film per day, a 70 per cent augmentation

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BRIDGE & BY-PASS

← FIGURE 7

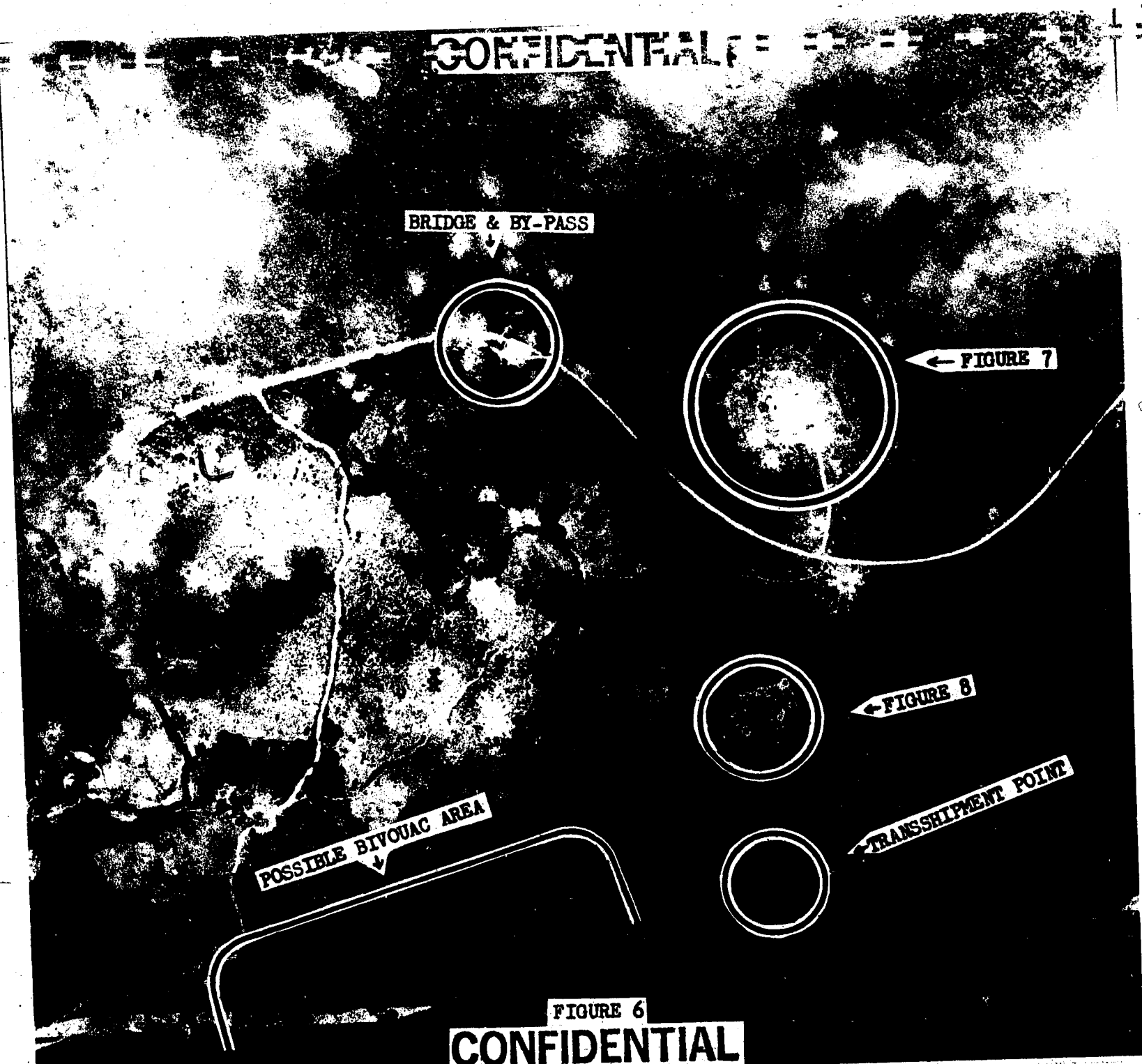
← FIGURE 8

← TRANSHIPMENT POINT

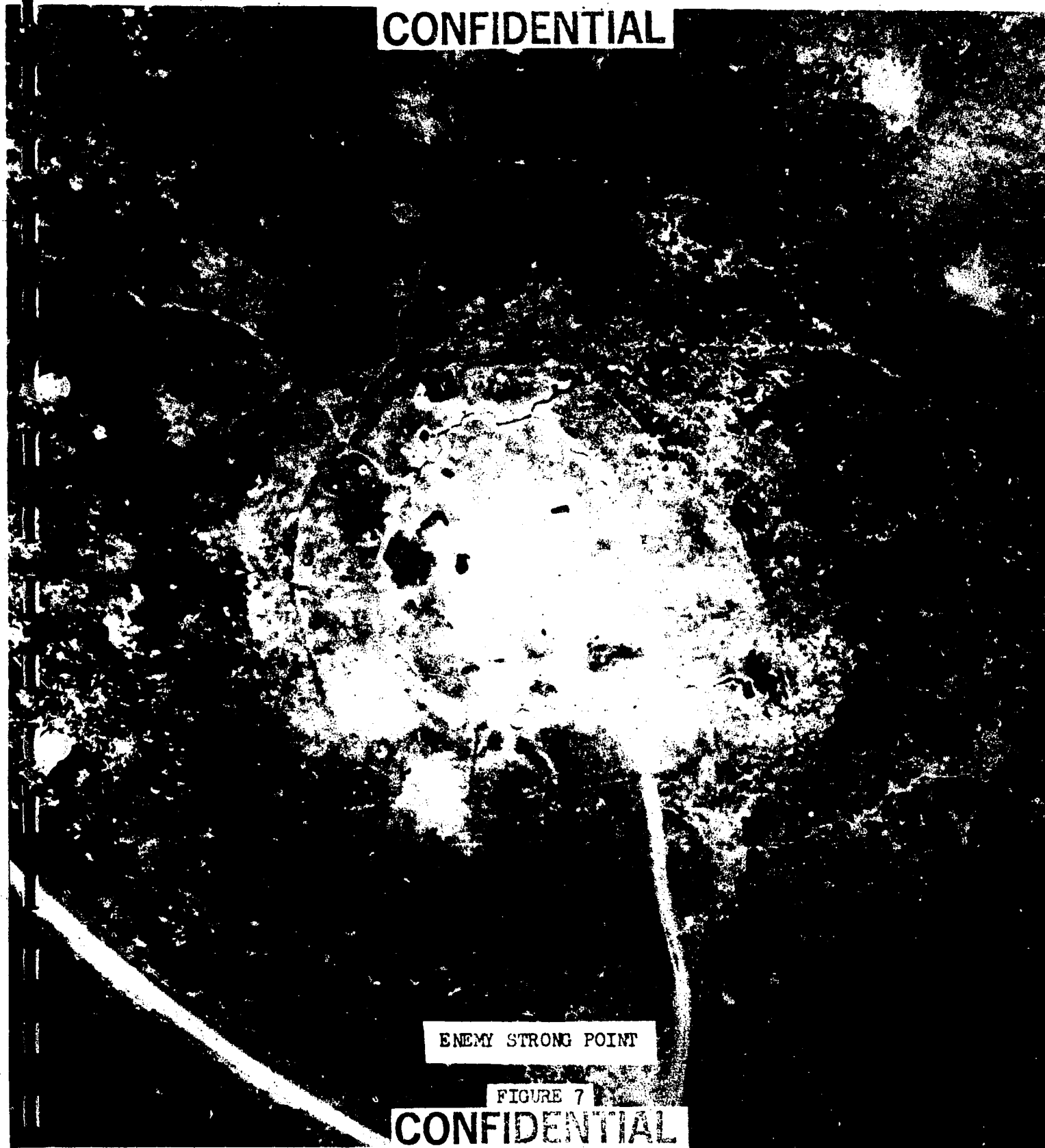
POSSIBLE BIVOUCAC AREA

FIGURE 6

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ENEMY STRONG POINT

FIGURE 7

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FIGURE 8

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in Photo Interpreter (PI) strength was effected. This permitted a 24-hour operation at full strength of 50 PIs and included both Air Force and TDY Army personnel ^{107/}

Although the NIAGARA photo exploitation effort was large, there was evidence that it was still not large enough to capitalize on the available reconnaissance. During February, adverse weather cut total reconnaissance sorties in half. With twice as much time to exploit available imagery, the interpreters found nearly four times as many targets as in any other period. The "lesson learned" in this case was that the interpretation capability was seriously out-paced by the volume of reconnaissance flown ^{108/}

A special report by Hq 7AF, DIPA, explained that the intelligence Task Force provided centralized management of the entire intelligence effort for NIAGARA ^{109/}. This Task Force was responsible for determining intelligence requirements and priorities which facilitated the efforts of the Deputy for Operations and the Director, TACC, in their employment of the reconnaissance force supporting NIAGARA. The entire reconnaissance effort in NIAGARA was centrally controlled by the Director, TACC, with a single objective--to locate the enemy so the full impact of airpower could be brought to bear against him, in the defense of Khe Sanh. This produced the most intensive tactical reconnaissance program initiated to date in the war in SVN.

Requirements for tactical reconnaissance during Operation NIAGARA were so critical that missions were flown even if there was only a 5 - 8 percent chance of success. Despite inclement weather which prevailed throughout most

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of the operation, 90 percent of all sorties fraged were flown; 1,616 reconnaissance sorties were fraged and 1,453 were flown. These covered 1,994 reconnaissance objectives which ranged in size from pinpoint ground locations to large areas involving several hundred square miles.

The management of intelligence resources and the orderly flow of materials for this massive targeting effort required a task organization that was autonomous with respect to the regular intelligence staff and its routine workload. To provide this, the NIAGARA Intelligence Control Center at Tan Son Nhut had immediate access to imagery interpreters and their materials, and direct support from other 7AF intelligence agencies. At its peak, the NIAGARA ICC was staffed by 213 personnel drawn from various elements of Seventh Air Force, 7/13AF, MACV, the Philippines, Hawaii, and CONUS ^{110/}

NIAGARA Control profited from the in-place 7AF Intelligence Data Handling System (IDS). Adapting existing resources, IDHS published the first Niagara Target List within 18 hours of its activation. Thereafter, a daily up-date target list was produced and transmitted to MACV, to the 26th Marine Regiment Fire Support Center at Khe Sanh, and to the 7AF strike planners. The file eventually covered over 2,000 targets, with entries detailing target identity, strike history, BDA and reconnaissance coverage.

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The "Niagara File" then was integrated into the "in-country" target data base. ^{111/}

As a result of this reconnaissance effort, 623 major targets were produced for strike aircraft--a rate of 1.4 targets per reconnaissance sortie. These findings collated with other intelligence resulted in 2,095 individual targets being nominated for strike. Nine hundred and seventy-eight were struck, 67 percent being attacked under CSS radar control. At the close of the operation, 1,483 targets had been deleted as a result of airstrikes and changes in status--from occupied to unoccupied--leaving 612 to be undertaken as part of the air support to be provided to the U.S. 1st Air Cavalry's counter-offensive operation in the area following the termination of NIAGARA on 31 March. ^{112/}

A reconnaissance section was established in the Intelligence Control Center to manage each facet of the reconnaissance and imagery exploitation cycle of the targeting program. This office determined requirements and priorities and scheduled imagery exploitation. Optimum use was made of the full range of photographic sensors (black and white, color, camouflage detection, infrared and high acuity), as well as electronic systems. Sensor selection was based on operational factors and the capabilities of individual systems to meet specific reconnaissance requirements. Nearly a million feet of film was processed in the development of these targets.

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Over half of the objectives were covered on black and white photography.^{113/} Use of color and camouflage detection was governed by the nature of the targets and by the availability of supplies, processing equipment and the need for low level flights. Experience with regard to color and camouflage detection imagery in NIAGARA showed that for optimum utilization of these sensors:^{114/}

Color/Camouflage Detection should be flown between 1000-1500 hours

Area and route segment coverage should be restricted to locations of known or highly suspected activity.

SAM, AAA, and AW sites are especially vulnerable to these sensors.

They should be flown on relatively cloud free days and not over unbroken jungle canopy.

In all instances, the lower the altitude the more productive the results.

By 27 January, the NIAGARA target development effort peaked at the rate of 300 targets in one day. The rate then leveled off. At its conclusion on 31 March, target development averaged 150 a day.^{115/}

Many lucrative targets continued to be developed in the NIAGARA area although the estimated major assault against Khe Sanh did not materialize.^{116/}

Among the unusual types of targets developed during NIAGARA were numerous caves, identified by intelligence as a possible enemy headquarters. The distinctive limestone formations of the Annamite Mountains lent themselves to such use. Figures 9, 10, and 11 depict several of the more

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APPROX 85'

LADDER

CAVE
OPENINGS

CAVES PHOTOGRAPHED IN NIAGARA AREA 24 FEB 68

FIGURE 9

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HEIGHT - 12'
WIDTH - 8'

CAVE
ENTRANCE

CAVE PHOTOGRAPHED 30 JAN 68 - 24 IM NW OF KHE SANH

FIGURE 10

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CAVE ENTRANCE



CAVE AREA PHOTOGRAPHED 2 FEB 68

FIGURE 11

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important caves, both before and after strikes. All were located in the northwestern corner of the NIAGARA area, the furthest 25 nautical miles from Khe Sanh. ^{117/}

One of the most lucrative targets, a primary ammunition and supply area at XD 765227 -- in the Co Roc Mountain area approximately 19 kilometers SSW of Khe Sanh, was reported on 15 February. Covey 673 directed two F-100s against this target at approximately 0425 hours on the 15th, and the strike resulted in three secondary explosions and one secondary fire. This strike was followed at 0848 hours by two A-1Es (Hobo 35) loaded with two BLU 32s, four LAU 59s, two M117s, and four frag bombs each. These Hobos worked the area for almost one hour, and Covey 673 reported that they had destroyed one primary supply area of 150 wooden crates and an ammo cache of 50 to 75 wooden crates. The Hobos also uncovered a 200 meter long trench with crates of ammunition stacked three high. Covey 673 observed the area still exploding and burning after two and one-half hours. ^{118/}

The Coveys continued to direct strikes against this target all day on the 15th, recording well over 1,000 secondary explosions and fires. As one FAC reported: ^{119/}

"This area is an extremely lucrative target that continues to grow in size and importance as more bombs open up and uncover more and more supply areas and ammo caches. Hobo 35 and Warpaint 300 (2 A-4s) have opened up extensive underground

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trenches 200 meters long with hundreds of crates of ammo. This appears to be a major portion of supply area. All areas struck with exception of two caves and 200 meter camouflaged trenches. Recommend Sky Spot throughout evening to prevent relocation of supplies. FAC received light SA fire from three kilometers south of target."

At 0200 hours on the following morning, Covey 673 VR'd this same area for ammunition and supply caches, and sighted signs of activity during the night. The previously reported trench filled with crates of ammunition had been partly emptied; the removed crates had been emptied and left in the area. However, there were still four large caches in the trench ranging "from 50 crates and up", about 2 x 2 feet and 3 x 9 feet in size. There were also a great number of crates and bags of rice stored above ground. Between 0259 and 0541 hours on the 16th, Covey 673 directed several more flights in against this target, reporting positive results. Since this target could well have been a major staging area for future attacks against Khe Sanh, the FAC strongly urged positive action be taken immediately to deny these supplies to the enemy. He suggested the following plans: ^{120/}

Helicopter-landing a reaction force to discover the extent of storage, plant demolition, and extract. FAC had received negative ground fire and had seen no active enemy defenses in the area.

Continuous day bombing by A-1E with napalm. Easily the best results had been achieved by this FAC with A-1E pinpoint placing of napalm and strafe. This is considered to be especially important where targets are in a confined area and require direct hit to destroy.

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Extensive ARC LIGHT for area coverage. FAC believed that an aggressive combination of these possible solutions could deny these supplies to the enemy.

The Hillsboro ABCCC mission report for 16 February commented:

"I would like to commend Covey 673 for the outstanding FAC job he has done the last three days. It is the best I have seen in the 20 months I have flown Hillsboro. Stream of strikes set up to cover area... 121/ to continue through the night."

With the 7AF TACC controlling the effort through the ABCCC, tactical air was able to respond more rapidly to targets acquired. Flights could be readily diverted from fragged targets to strike immediately under FAC control as required. For instance, hot item targets, which were by definition an immediate threat and transitory, when developed by the Intelligence Task Force were passed immediately to the TACC. In turn, the TACC would make direct contact with the ABCCC to place an immediate strike on the target. 122/

The single greatest hindrance to target acquisition and tactical response in the NIAGARA area was the northeast monsoon, for which the enemy had planned to his advantage. During January, February, and part of March, weather in NIAGARA was extremely bad, restricting visual acquisition of targets and ordnance delivery. Much of the time, heavy clouds engulfed the mountain peaks throughout the area, while fog hugged the valley floors around Khe Sanh. Because of this, a high percentage of tactical strikes had to be directed into the target area by MSQ or

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Marine TPQ ground directed radar bombing units. ^{123/}

During the first 29 days, before the monsoon peak had passed, a daily average of 65.2 percent of all ABCCC controlled NIAGARA strikes were directed by these Combat Skyspot radar systems. It is logical to assume that an equally high number of other tactical air strikes (controlled by other agencies during the early part of NIAGARA) were flown into the area under ground radar direction. A Marine TPQ was actually positioned at the Khe Sanh Base Camp, and according to Covey FACs who observed strikes directed by this unit, it was highly accurate in directing strikes in its own defense--more so than units positioned further away. ^{124/}

The Coveys also worked with the fighters making strikes under Skyspot direction, and often assisted by reporting results and target adjustments to the fighters. At times, when not forewarned of Skyspot strikes in the area, the Coveys have found themselves in the unenviable position of ordnance being expended over the area in which they were flying. ^{125/}

One of the 7AF liaison officers, who was also a Covey FAC, at Khe Sanh considered the TPQ located there to be one of the primary weapons systems for defense of the base. It was also considered to be a primary target for enemy artillery being applied against Khe Sanh. The liaison officer noted that if a major assault against the base had been made, this TPQ could "effectively be used against enemy forces

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in close proximity," while the effectiveness of units located further away would be questionable. He made the suggestion that a back-up TPQ be provided at Khe Sanh, since the enemy could well score a direct hit against the single unit. Although this system was out of commission for periods of short duration, it was fortunately not demolished by incoming fire. ^{126/}

Another factor which had an impact on effective application of tactical strikes was obvious: ordnance on occasion being incompatible to terrain or targets being struck. This, of course, is always a primary consideration in tactical air application; however, ordnance selection considerations were compounded in NIAGARA due to the great amount of airpower being applied in the area, and the great variety of tactical target situations which could develop. A good example of ordnance incompatibility was reported in the Lang Vei attack, when immediately available tactical aircraft were armed with heavy bombs, and the ground situation precluded the effective application of such ordnance. Problems in ordnance selection were more prevalent during the first few weeks of NIAGARA, when certain coordination and control conditions adversely affected tactical planning. This will be discussed more fully under "Coordination and Control".

By late February, the 7AF Director of Combat Operations advised all tactical units that "it is becoming increasingly imperative" that the pressure on enemy forces and the effectiveness of strikes "be maximized". ^{127/} Not only had the pressure against Khe Sanh become

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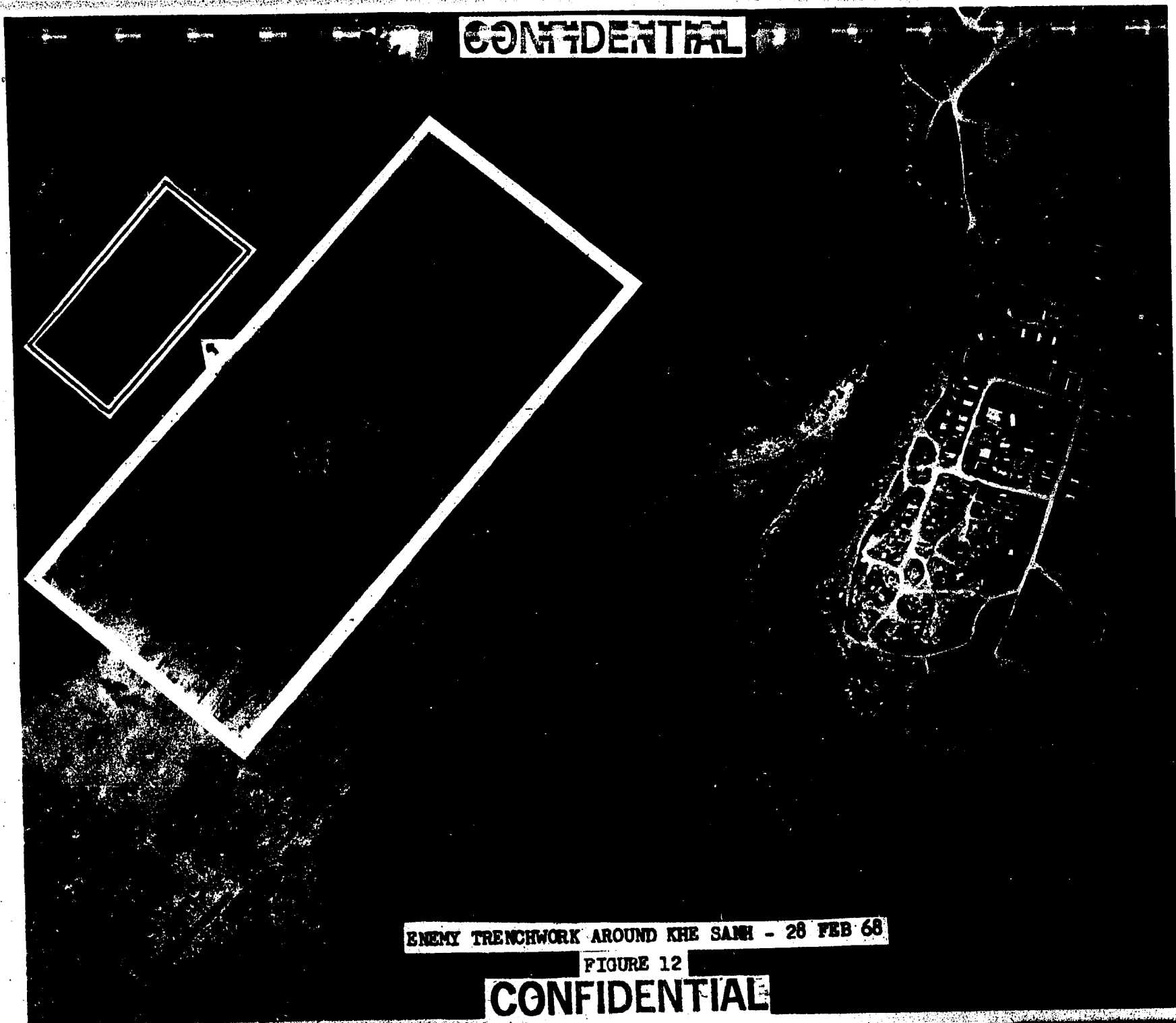
more intense, but the enemy had actually burrowed in around the Khe Sanh perimeter. One trench was discovered extending beneath the base defense wire, and it was estimated that the enemy might attempt to tunnel beneath the defensive positions and plant explosives. A III-
128/
MAF report noted:

"On 25 February, a 3rd Mar Div AO observed a trench extending due north to within 50 meters of the Khe Sanh Combat Base perimeter. This new trench is an extension of the trench network reported in earlier message. This represents approximately 700 meter extension in less than 24 hours. New trench is reported to be two foot wide, approximately four foot deep and terminates in a trench approximately 50 meters long running parallel to Khe Sanh wire. Another trench was observed, and the AO received intense automatic weapons fire from trenches and surrounding area."

The 7AF Commander continued to place emphasis on the effective application of tactical airpower against targets developed in the Khe Sanh area. The around-the-clock weight of effort was sustained against these targets, and a special office had been established within the TACC to closely monitor the NIAGARA effort, and keep the commander and his staff posted. Also, a separate frag team had been formed to develop the NIAGARA
129/
frag order -- to more effectively apply the total weight of effort. In accordance with this command emphasis, 7AF tactical units were given the following directions on 26 February:

"All strike pilots and FACs will be briefed prior to next flight on the criticality of the ground situation and the urgency of using every means to press home the

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ENEMY TRENCHWORK AROUND KHE SANH - 28 FEB 68

FIGURE 12

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attack. Specifically, release altitudes for dive deliveries must be reduced to minimums to improve accuracy in destroying pin point targets and effecting road interdictions. Upon completion of dive deliveries, maximum time, within fuel limitations, will be spent on armed reconnaissance of routes and key LOCs in the target area with first priority on Route 9 and Route 922. The areas along Route 9 and 922 are loaded with supplies cached on either side of the road and troops have also been seen in these areas. If no specific targets are found the FACs will direct flights to expend 20-mm in strafing runs along the sides of the roads from the road bed to 50 to 100 yards out.

Any areas from which secondary explosions or fires are observed will be struck by follow-on flights. FACs are directed to be especially alert for tanks, trucks and armored vehicles parked close to roads and rivers and for POL drums and other supply caches.

It is imperative that Route 9 from Tchepone to Khe Sanh be maintained unserviceable with maximum interdiction effort. F-105s diverted from Alpha Package will be carrying 1/3 time delay bombs and will be given priority for interdiction strikes along Route 9.

To assist intelligence gathering efforts, maximum use will be made of gun cameras, KA 7i and strike cameras with film forwarded through intelligence channels to 7AF DI

The urgency of immediate increased pressure on the enemy forces is of the highest priority and every effort is directed to maximize the effectiveness of our air resources."

Several tactical strikes in immediate support of Khe Sanh near the end of February were reported to be very productive. Strikes on 25 February were a good example. Just before noon on the 25th, the ABCCC reported that Khe Sanh was under heavy fire from rockets and mortars. Although the NIAGARA area was "generally unworkable" except by Combat Skyspot during this period, portions of the western area opened for short

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periods at midday for visual strikes. Khe Sanh was in this western portion, and the Covey FACs spotted seven rocket and mortar positions which were directing fire against the base. A-1s with soft ordnance were immediately diverted to strike these targets. ^{131/} The Coveys also directed jets in against the guns, and the combined strikes silenced them. ^{132/} All seven positions were reported destroyed or damaged.

Every break in the weather was exploited to conduct visual strikes against the enemy forces immediately threatening Khe Sanh. On the previous day, the 24th, the weather had broken around Khe Sanh during the afternoon, and Hillsboro reported. ^{133/}

"Flights with napalm and high drags were scrambled throughout the afternoon against troop concentrations and gun emplacements in the Khe Sanh area."

While continuing to press attacks against active targets in the vicinity of Khe Sanh at every opportunity, tactical fighters also continued to interdict enemy logistical movement into the area. Heavy traffic continued to be noted on all routes and trails in all of the NIAGARA area, the Laotian corridors, and Route Package I. The ABCCCs constantly reported that the FACs were involved with strikes against truck parks and moving vehicles. For instance, on 23 February, the "Alleycat" ABCCC reported that strikes in Route Package I had destroyed 43 trucks and two probably destroyed. ^{134/} These strikes also produced 36 secondary explosions and 25 fires.

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One example in the NIAGARA area occurred on 24 February. After the TACC briefed the "Hillsboro" ABCCC on a truck park discovered by NIAGARA photographic reconnaissance taken on 17 January, Covey 671 checked on one of the coordinates, XC808843, and reported it to be a very likely area. After two flights worked the target, Covey 671 reported the largest bunker he had ever seen. A total of six flights produced six secondary explosions and one bunker destroyed. ^{135/}

Earlier, on 22 February, the Coveys had directed strikes against numerous trucks, and reported twelve were destroyed. They also reported nine secondary explosions and 14 fires ^{136/}

"Nail" FACs from Nakhon Phanom working the STEEL TIGER interdiction area near NIAGARA also continuously sighted trucks which were probably supporting the enemy around Khe Sanh. In one instance, on 24 February, Nail 47 sighted a truck towing a howitzer. The truck was moving east toward Khe Sanh with the weapon. Both the truck and the howitzer were destroyed by two tactical flights ^{137/}

Covey FAC reports indicated that despite the continuous interdiction effort, the enemy continued to move, often over what were considered to be impassable trails. Roads were under constant repair. For example, in late February, Coveys 123 and 135 reported on the condition of Route 9: ^{138/}

"VR'd Route 9 between Tchepone and Khe Sanh. Route is being used by both trucks and tracked vehicles. Tread tracks observed entire length of Route VR'd. Repair

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work is being done over the entire length of this road. Culverts are being constructed to replace destroyed bridges and fords. Road cuts and ford cuts are apparently ineffective along this route at this time as they are all being bypassed or repaired immediately."

On the same day, Covey 658 reported on enemy road repair: ^{139/}

"Observed 100 meters of road 15 ft. wide running north to south through a deep depression with heavy foliage along both sides. One week ago only ten meters of this road was observed."

Seeding the roads with MK36 mines was also accomplished. The overall effect of these missions was considered to be favorable; however, there were occasions when a mission proved ineffective. One FAC reported one instance in which the mines were observed "going off right after seeding took place" This caused a chain reaction setting off several others. He suggested that the MK36 be used on Route 9 and fords in the evening hours. In the event of similar occurrence, disruption of night traffic might be effected even though the seeding mission failed ^{140/}

While pressing the attack against the enemy, the FACs and fighters faced very heavy and accurate enemy ground fire. One FAC reported on his experience during the first few weeks of the operation: ^{141/}

"We have had a difficult time determining any kind of pattern of enemy fire. Small arms in some areas is very intense. Generally, they won't open up with small arms unless you have found something, or they really have something they want to protect. One experience really caught me off guard. I was a few miles from

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Target 10, which had been previously identified as a pretty heavy triple A threat area. Being new at the time, I wasn't familiar with it. They really opened up on me, before I spotted anything. I applied the general tactic, which is to turn a lot and get as close to the ground as possible, and departed the area

We came back in later on a VR flight, about two miles from the hot area, and again they started opening up on us. Real heavy fire; they chased us around the sky for a long time. We finally located the guns and determined that there were ten or twelve 37mm guns sitting out around Target 10, all revetted."

Judging from past combat experience, weapons discipline was a basic characteristic of seasoned enemy forces in Vietnam. Normal FAC experience was that seasoned enemy troops would not open fire on aircraft until certain of FAC detection, i.e. FAC aircraft loitering over the target for an extended period or actually directing fighters to the target.^{142/} In Operation NIAGARA, however, FACs on more than one occasion found themselves being fired upon, without having detected enemy positions. This probably resulted from the large number of enemy forces in the area and the continuous air activity. In view of the fact that all forces in the area were NVA soldiers, it would appear logical that they were well trained troops, if not seasoned veterans. They were certainly well armed; practically every enemy position and vehicle convoy had anti-aircraft fire support. This is reflected in the following excerpts from FAC reports during one four day period in late February:^{144/}

Covey received 23-mm fire from four positions north of target 674. The fire was very accurate from all four positions. FAC suggests guns are radar controlled

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because fire from all positions converged into close proximity of FAC. FAC was at 6500 ft AGL and the rounds were bursting both above and below the aircraft. The line of fire from positions was straight at the aircraft and came very close to hitting. The night was very dark with no moon and aircraft did not have lights on and still fire was very accurate. It would be impossible to come this close to hitting the aircraft by shooting at a sound at 6500 ft AGL.

FAC received heavy 37-mm fire from one position west of target 713 and eight to ten positions approximately 1000 meters south of target 713. FAC received approximately 500 rounds from one position. 37-mm was extremely accurate. Weapon probably centrally controlled.

FACs received 250-300 rounds, inaccurate fire bursting at 10,000-14,000 feet from 10 37-mm positions. FAC recommends suppressor fighter aircraft be made available both night and day for the Target 4107 and 713 interdiction points. Intense 37-mm fire from these points virtually makes it impossible to put in strike aircraft. Hard ordnance is almost useless at night. Recommend CBU-24 and CBU-29.

VR'd Route 96 from D-39 to D-89. Sighted with Starlight scope four trucks going north. While following the trucks, FACs received 50-cal fire from a position just north of the trucks. FAC suspects the AA weapon was mounted on a truck as the fire seemed to come from the road. While FAC was evading the AA fire, he sighted three vehicles moving south. While watching these trucks, FAC received 23-mm fire from the vicinity of target 621. While evading this fire, FAC also drew fire from a 23-mm position in the vicinity of target 674.

Coveys 673 and 642 sighted numerous fires in vicinity of road throughout target area. Trucks were picked up moving through these fires. FAC had difficulty with situation and believes fires are being used to obstruct observation of area for vehicle movement. FAC recommends

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heavy ordnance on interdiction points in target 4107 and target 713 area. Target 713 has many gun positions defending this area making it almost non-permissive for FAC type aircraft.

The enemy threat in the NIAGARA area did not appear to wane by the end of February; however, his one major advantage--the north-east monsoon--was on the decline. Although there would still be days of inclement weather in March, there would also be more breaks in the weather--making the enemy more vulnerable to pin-point targeting and visual expenditure by tactical fighters. At this point, the 7AF Commander reported to COMUSMACV: ^{145/}

"In the first thirty-nine days of Operation NIAGARA, U. S. Air Forces--Tactical, Naval, Marine and Strategic--have dropped fifty-three thousand four hundred tons of ordnance in support of the defense of Quang Tri Province .

"This effort has produced more than two thousand five hundred secondary explosions, nearly one thousand secondary fires, and has destroyed or damaged one thousand structures and bunkers. More than one hundred trucks have been destroyed, and unknown number of enemy soldiers have been killed or wounded. Captured documents and prisoners continue to reflect postponement of scheduled operations and destruction of LOCs. These results, impressive as they are, reflect the achievement of slightly more than one-half of the thirteen thousand three hundred effective strike sorties that were flown between 22 January and 29 February. The damage caused by the remainder, forced by

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poor weather to release munitions under radar control, cannot be assessed directly. The air support so far rendered to land forces in Operation NIAGARA is unprecedented in the history of aerial warfare. Although these operations appear to have contributed much to thwarting the enemy's plans, they should not be looked upon as an effective substitute for those ancillary ground actions which alone can frustrate the enemy's effort to tunnel into and under the Khe Sanh base."

ARC LIGHT Responsiveness

As previously noted, the destructive bombing capability of the B-52 ARC LIGHT force was a key element in the sustained NIAGARA effort. MACV targeting for the B-52s and actual strike operations were underway prior to the beginning of sustained tactical strikes on 22 January. According to MACV officials, established procedures prior to NIAGARA had been tailored to strike relatively stable, well-known targets. With the commencement of NIAGARA, the requirement was for rapid response of the B-52s to targets as they were developed. To accomplish this rapid response capability, the area of interest was overlaid with a system of preplanned grids with each grid comparable to the area covered by a B-52 mission. This provided a means for rapid coordination between the ground and the air officials in the preparation and strike of selected targets. It also provided the capability to divert the B-52 strike aircraft within ^{146/} three hours of bomb release.

The Intelligence Control Center generated targets 24 hours a day, as ground units and specialized sensors fed in new data. Tactical air responded on short notice, dropping under radar control if weather or

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darkness precluded visual attack. New procedures were devised under the nickname BUGLE NOTE which enabled the B-52s to respond with similar flexibility. The NIAGARA area was overlaid by a grid system in which each "box" represented a 1 x 2 kilometer target, an area that could be effectively covered by one cell of B-52s. Under the new concept, every one and one half hours, a cell of three B-52 aircraft would arrive at a predesignated pre-IP to be picked up by MSQ and directed to one of a series of IPs and then to a specific target. The target could be changed each one and one half hours or could be kept the same for each arriving force until required at another aiming point. With regard to B-52 targeting, SAC explained: ^{147/}

"To further simplify mission planning and stabilize reaction, secondary alternate targets would preferably be located in the Kontum/Dak To area. These targets must be capable of supporting the entire effort. Once fragged, the alternate/secondary target must remain in effect."

SAC explained that the B-52s would be expending ordnance on a target in the area of concern every one and one half hours. These TOTs could be varied to as low as one hour spread or increased to two hours as necessary to preclude establishing a TOT pattern for the enemy. The timing of this operation was described as follows: ^{148/}

"A cell of three B-52s would take off from Andersen every three hours and proceed to its MSQ pick up point pre-IP and then through IP to target arriving as an example at 1200Z, 1500Z, 1800Z, etc. Every three hours a cell of three aircraft would take off from U-Tapao and proceed to its assigned MSQ pick up point pre-IP and through IP to target arriving there at 1300Z, 1630Z, 1930Z, etc."

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Certain limitations are inherent in an operation of this type. SAC listed the following: (1) MSQ must have a target for a cell to drop every one and one half hours, (2) No other ARC LIGHT targets could be attacked during the period this emergency operation is in progress, i.e. 48 sorties per day during emergency in I Corps area, (3) and, for strikes in the SAM Watch Zone, TINY TIM (EB-66s) would be required. ^{149/} CINCPAC cautioned that the cyclic type of operation conducted under BUGLE NOTE would permit the enemy to arrive at rather accurate estimates of the time the B-52s would be in the vulnerable area. Thus, the enemy would have an increased potential to exploit his capability to launch a MIG attack against B-52s in northernmost I Corps. "All forces need to be particularly alert to this new dimension of the threat," CINCPAC advised. ^{150/}

SAC also advised that it was prepared to support ARC LIGHT with alternately six or nine sorties per day from the Port Bow (Korea Contingency) resources located at Kadena AB, Okinawa "subject to JCS approval and availability of weapons". ^{151/} COMUSMACV concurred fully with the SAC proposal, and requested CINCPAC approval. Regarding the use of Kadena resources, COMUSMACV requested two additional strikes of six aircraft per day, if available and approved. These would be in addition to the 48, and would be utilized below the 14 degree parallel. COMUSMACV made the following points relative to BUGLE NOTE Implementation: ^{152/}

Secondary targets when required would be designated and submitted twelve hours prior to effective time.

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TINY TIM support would consist of EB-66 coverage in the SAC designated SAM Watch Zone:

Iron Hand would be provided whenever the target route penetrated a known or suspected SAM ring.

The use of BLU munitions was considered and not deemed feasible for the operation due to troop clearance requirements and lack of flexibility to use secondary/alternate targets. However, BLU munitions would be requested on specific targets when they could be used to advantage.

CINCPAC approval was obtained, and the BUGLE NOTE concept was implemented on 15 February, along with the sortie increase through use of the Kadena B-52s. In NIAGARA, this meant around-the-clock B-52 operations -- 16 missions per day with three aircraft each over the target every one and one-half hours. Shortly after implementation of this improved concept in NIAGARA, COMUSMACV requested that a BUGLE NOTE capability be developed for certain other key target zones in South Vietnam. Five days after NIAGARA terminated, the Chief, SAC ADVON, at Ho 7AF reported on BUGLE NOTE developments to that time: ^{153/}

"... 3AD supplies ten six ship sorties a day to pre-determined IP gates and SAC/ADVON/TACPAL provides target information to the MSQ sites. A southern and central BUGLE NOTE capability has also been developed and MACV now has an ARC LIGHT reaction capability by target selection or change of three hours. In the few areas not covered by BUGLE NOTE IPs, the usual 24 hours in advance preplanned missions will be used. The sortie rate and this target change capability down to within three hours of TOT has resulted in elimination of the Quick Run Alert Force.

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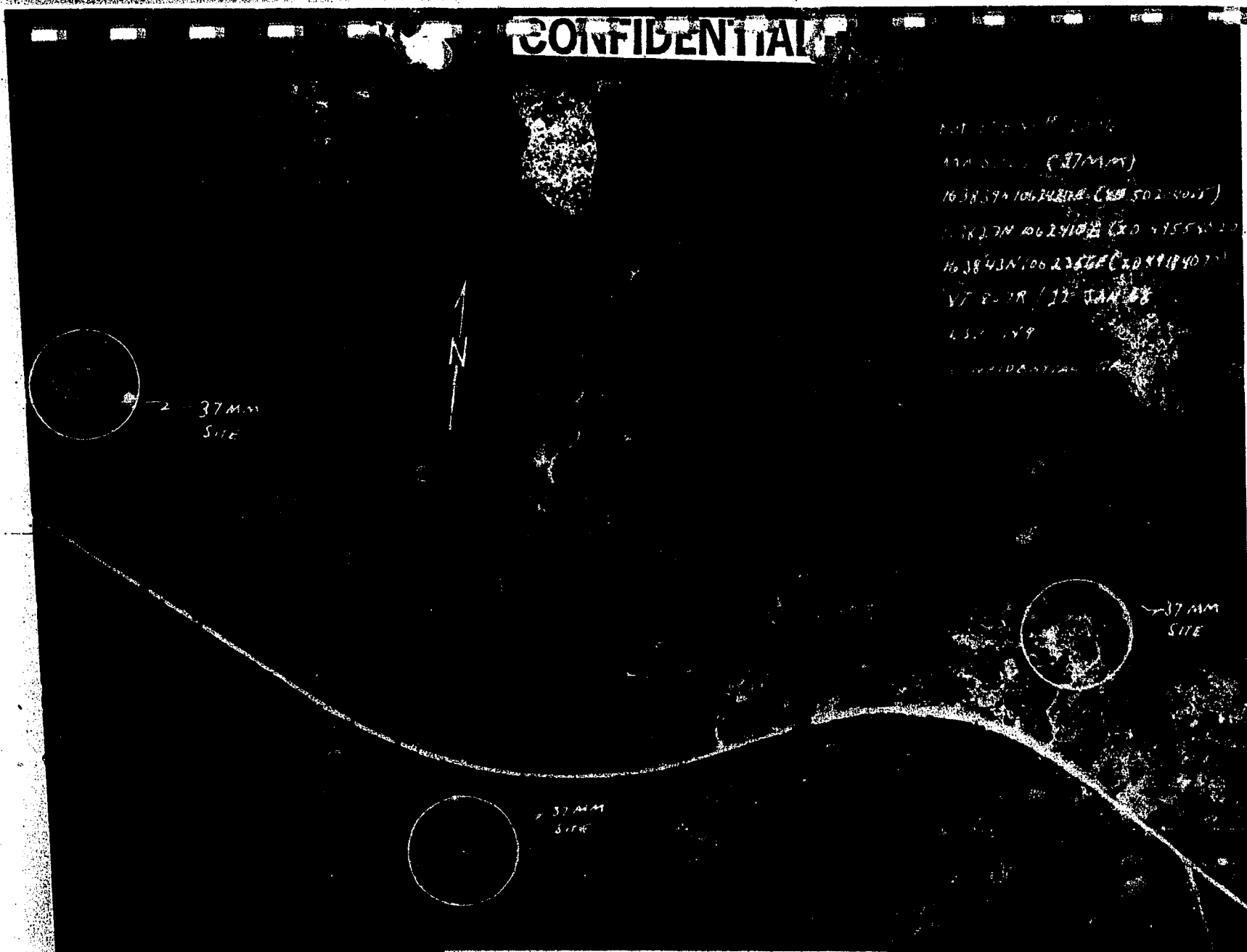
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ADVON is now fulfilling the original Terms of Reference in functioning as the operational planning agency. We select all TOTs, weaponeer the target, recommend axis of attack and base to provide the strike for preplanned missions. All of the BUGLE NOTE planning from pre-IP through target is the sole responsibility of ADVON. The relationship with MACV is excellent and their actions are now primarily concerned with target evaluation and selection."

Another significant development concerned a relaxation of the rules for B-52 strikes. Prior to NIAGARA the B-52s were restricted from expending their ordnance to within three kilometers of friendly positions. On 13 February, COMUSMACV advised CINCPAC that the tactical situation at Khe Sanh and in other areas of Quang Tri, such as Con Thien and Camp Carroll, "may require that full defensive fires be brought into close proximity of defensive positions". He recommended that the 3 kilometer clearance from friendly combatants be rescinded, and that this clearance be determined on the basis of the tactical situation, by the tactical commander, as approved by Hq MACV ^{154/}. The clearance limitation was subsequently relaxed to one kilometer from friendly combatants ^{155/}.

Discussion of the B-52 effectiveness in the NIAGARA area will be covered in the operational summary. Prisoner and captured document information relative to B-52 strikes will also be presented in that section; however, it seems appropriate to conclude this section of the study with the comments of one Marine ground commander relative to the results of one B-52 strike of 9 February. On this date, this officer's unit received the support of two ARC LIGHT strikes, one at 1700 hours and one at 1750. He reported: ^{156/}

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UNOCCUPIED AAA SITES IN NIAGARA AREA
FIGURE 13

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"All in the area were awed at the devastating accuracy and destruction displayed by your pilots and weaponry. For the past two weeks enemy activity in and around the target has been such that our ground operations have been exposed to continual harassment. It is my belief that today these enemy forces were struck a blow so severe as to render them ineffective for an appreciable period."

"A large number of NVA troops were observed actually running from the bombed zone following the first strike. They seemed oblivious to anything but putting distance between themselves and the oncoming bombs. Consequently, all were travelling in the same direction and at the same speed presenting a very tight, compact target. Observers witnessed one bomb of the second strike score a direct hit on the group which, needless to relate, utterly disappeared."

Enemy Counter Air Activities

As previously mentioned, the enemy made provisions for an active AA defense of key areas around Khe Sanh. 7AF Intelligence officials reported that in scope and firepower they were totally inadequate. Almost all were automatic weapons or small arms. The largest caliber AA threat against tactical aircraft proved to be the 37mm AA gun, frequently reported but never clearly photographed during NIAGARA. Every identified 37mm site was struck until its destruction or abandonment could be confirmed by photography. Smaller AA/AW positions were attacked visually whenever they posed a threat to the air mission. Over 300 gun positions were reported destroyed (by either aircrew observation or photo BDA) out of more than 600 struck during NIAGARA. ^{157/}

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Extensive steps were taken to suppress ground fire in the approach and egress lanes to the Khe Sanh airstrip. The ground track of aircraft arriving and departing Khe Sanh was plotted from the point where an incoming flight would penetrate 3500' AGL to the point where outbound aircraft would regain that altitude. From that center line a lateral offset was made equivalent to the slant range of the 37-mm AA weapon against the flight path. This established approach and withdrawal lanes within which the active flak suppression operation was conducted. Transports entered, normally from the east. FAC aircraft flew off either wing-tip to spot AA positions and direct strikes, with escort fighters in trail. All signs of AA fire -- flashes or puffs of smoke -- were immediately engaged. As an additional aid, other fighters laid smoke parallel to the runway center line along the approach and departure routes. ^{158/}

The flak suppression effort was extensive and ultimately effective. Although roughly two-thirds of the tonnage delivered during NIAGARA was air-dropped, landings were made at Khe Sanh on all but eight of the 70 days of the operation. All in all, 56 aircraft were hit and three downed representing 0.2 per cent of the total sorties flown. An additional C-123 was destroyed on the ground. ^{159/}

Against the B-52s, the enemy could protect himself as he had through the years along the Ho Chi Minh Trail by concealment, dispersal and constant movement. However, his concentration on a point objective

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limited movement and dispersal, and the intensive NIAGARA targeting effort destroyed his concealment. A credible SAM threat in NIAGARA might have inhibited ARC LIGHT operations, but there is no evidence the enemy attempted to introduce one. Ten days prior to NIAGARA, he fired four SAMs at a formation of B-52s over the central DMZ (YD087844-1702N/10655E), and intelligence carried a SAM threat in this general area throughout the NIAGARA period, but no more firings were observed until 25 May, almost two months after NIAGARA ended. ^{160/}

Tactical Airlift at Khe Sanh

From the time the decision was made to hold Khe Sanh, its tenability became almost solely dependent upon airpower. This was true, whether the enemy really looked upon the besieged base camp as a major objective, or whether they merely considered it a point of diversion for other alternatives. The primary defense of Khe Sanh was the sustained tactical strike and B-52 effort -- without which the base could well have fallen.

The 6,000-man U S. Marine and ARVN force at Khe Sanh was equally dependent upon airlift for its tenability. With the enemy occupying the high ground around it, and its ground supply routes severed, Khe Sanh would have become isolated had it not been for air resupply.

Although the III MAF had an organic airlift capability, it was not within their capability to assume a resupply role of the magnitude required at Khe Sanh. Thus, it became largely dependent upon the 834th Air Division to keep the base resupplied and to evacuate the wounded.

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By the time the ground resupply routes had been reopened almost three months later, the 834th AD had delivered over 12,400 tons of supplies to the forces at Khe Sanh. Of this effort, 8,120 tons were delivered by airdrop, and 4,310 by air landing under extremely hazardous conditions. ^{161/}

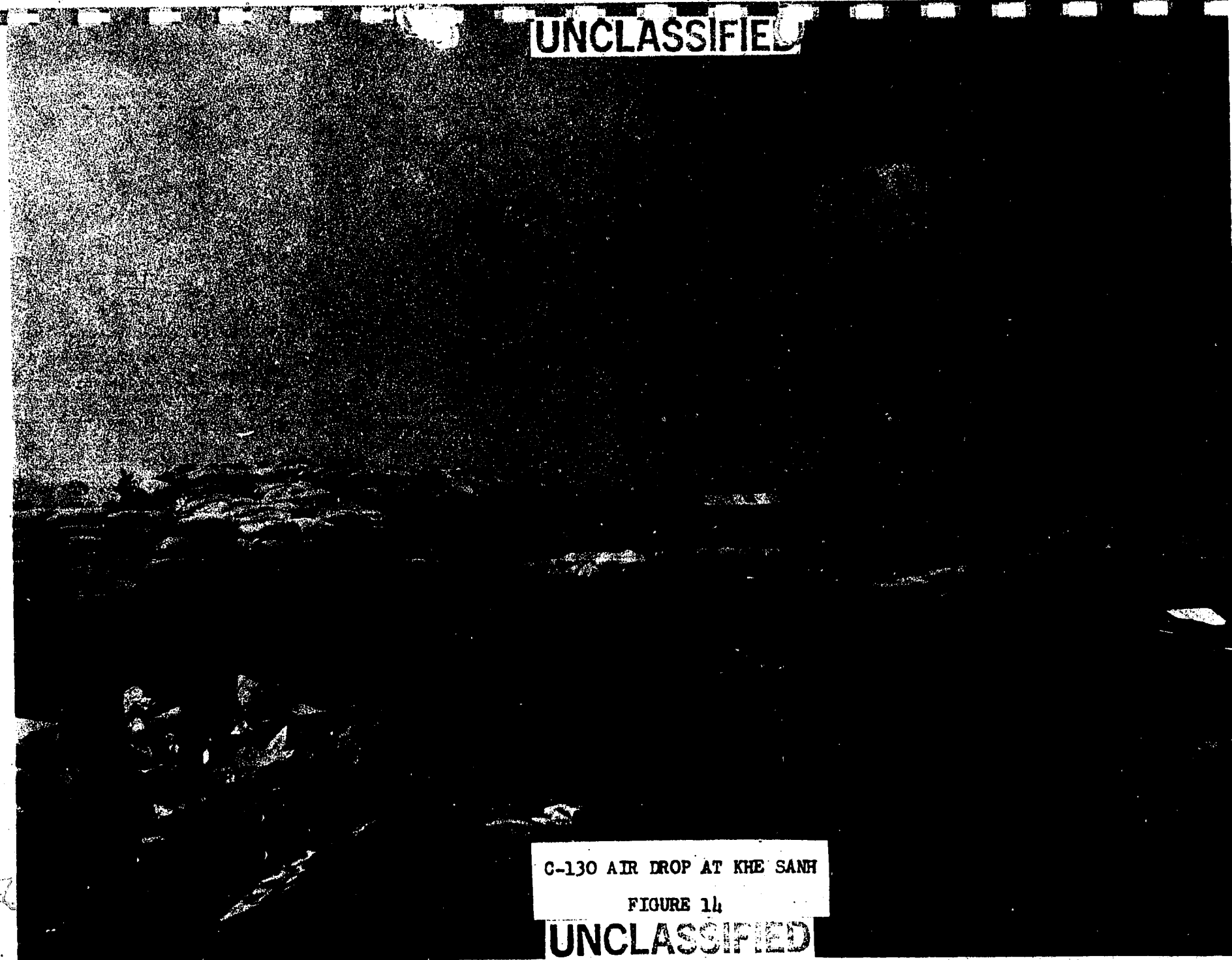
Prior to mid-February, enemy bombardment at Khe Sanh had become so accurate and intense that all aircraft landing at the airstrip had become prime enemy targets. "We have let the NVA get so close that he can put 50-caliber fire on the center line one half mile from final," one pilot commented on 19 February. No sooner would aircraft land, than incoming mortar, rocket, and artillery fire would begin. A Covey FAC ^{162/} who often landed at Khe Sanh made the following observations:

"Enemy weaponry has been moved up now (mid-February) to the point where we are being bombarded by high-angle short distance trajectory, rather than low-angle long distance trajectory. For example, there is a hole just off the runway at Khe Sanh that is quite unlike those made during January. The ones on 21 January were long gouges with little depth. There is a hole up there today that is a real crater. That round went straight up and came straight down. We still land there, but we won't land when there is a C-123 or C-130 there because they are a magnet for this heavy bombardment."

In view of the extremely hazardous ground situation and monsoon weather conditions, 834th AD officials advised the III MAF that air drop methods would have to supplement ground offloadings if the required tonnages were to be delivered at Khe Sanh. Three air drop methods would be used: (1) Ground Proximity Extraction System (GPES), (2) Container

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C-130 AIR DROP AT KHE SANH

FIGURE 14

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SUPPLIES LANDING IN DEEP WATER

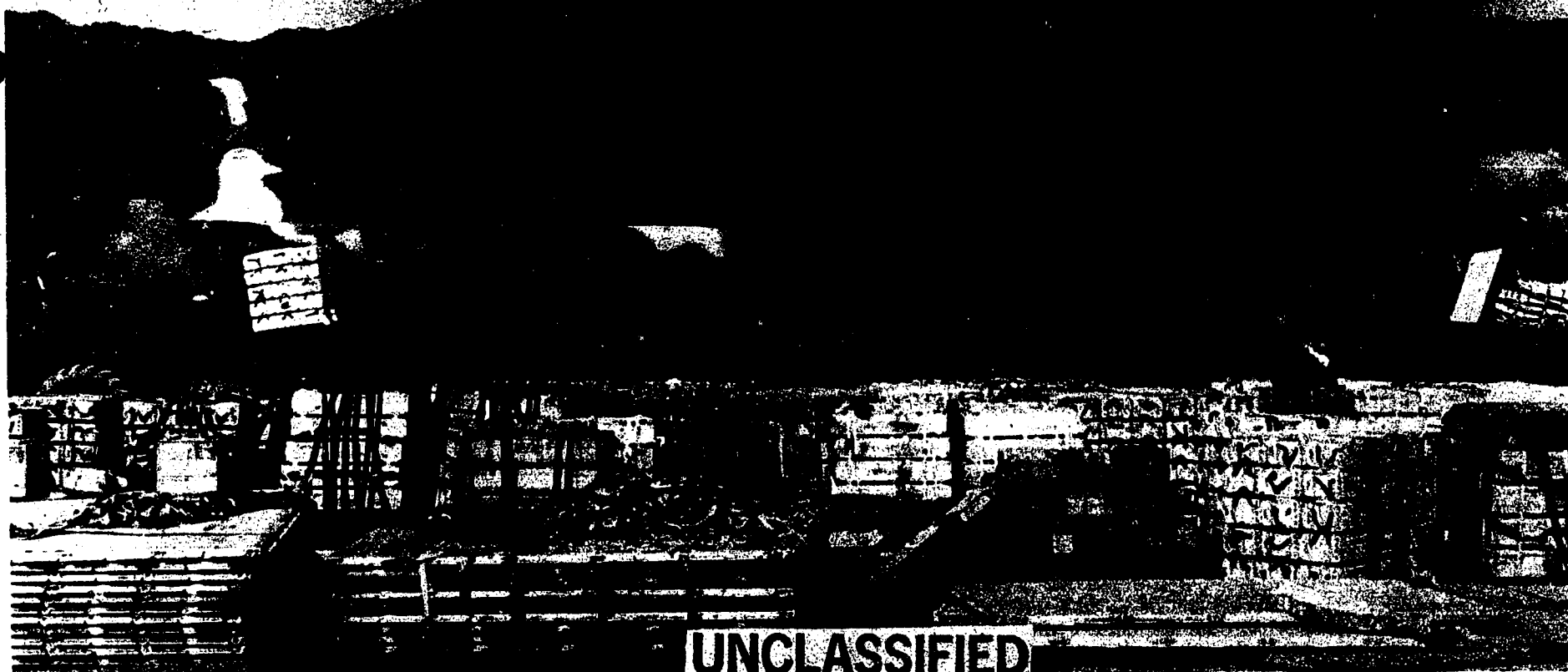
FIGURE 15

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C-130 PREPARES FOR DEPARTURE FROM THE SAAR.
SMOKE RISES FROM A LINE OF DEFENSIVE FIRE
LAID DOWN BY 7AF AND NAVY STRIKE AIRCRAFT.

FIGURE 16



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Delivery System (CDS), and (3) Low Altitude Parachute Extraction System (LAPES). Navigational techniques and problems associated with these air drops will be discussed under "Coordination and Control".^{163/}

At first, the Marines were reluctant to agree that air drops represented the optimum means of delivery under the existing conditions. There were certain drawbacks, from the ground point of view. For instance, there was not sufficient room within the defense perimeter, and drops had to be made outside the "secure" area. This required additional security measures, and presented potential problems in recovery. One report also said that the Marine commanders were concerned that a slackening off in aircraft landings would adversely affect troop morale.^{164/} Perhaps the opposite was the case, in view of the fact that a definite rise in enemy shelling occurred with aircraft landings.

Also, since the drop zone was outside the base perimeter, it was unguarded overnight, thus requiring sweep operations each morning to secure the area for drops. The drop zone also had to be cleared of supplies prior to withdrawal in the evening. This resulted in a compressed daily time period for resupply drops.^{165/} Although most drops were successful, another problem arose when some drops went astray and could not be recovered prior to nightfall. These had to be destroyed to prevent enemy capture.^{166/}

Recovery time by the Marines, of course, was directly proportionate to the location of the drop. Pallets located within the drop zone were quickly recovered. The Marines reported that the average time required to

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clear one drop was 45 minutes if all pallets were in the drop zone. Pallets outside the drop zone resulted in several additional hours for recovery. ^{167/}

Although initially reluctant, the Marine commanders were soon convinced of the reliability of the 834th AD effort. A III MAF message to the 7AF Commander on 26 February said: ^{168/}

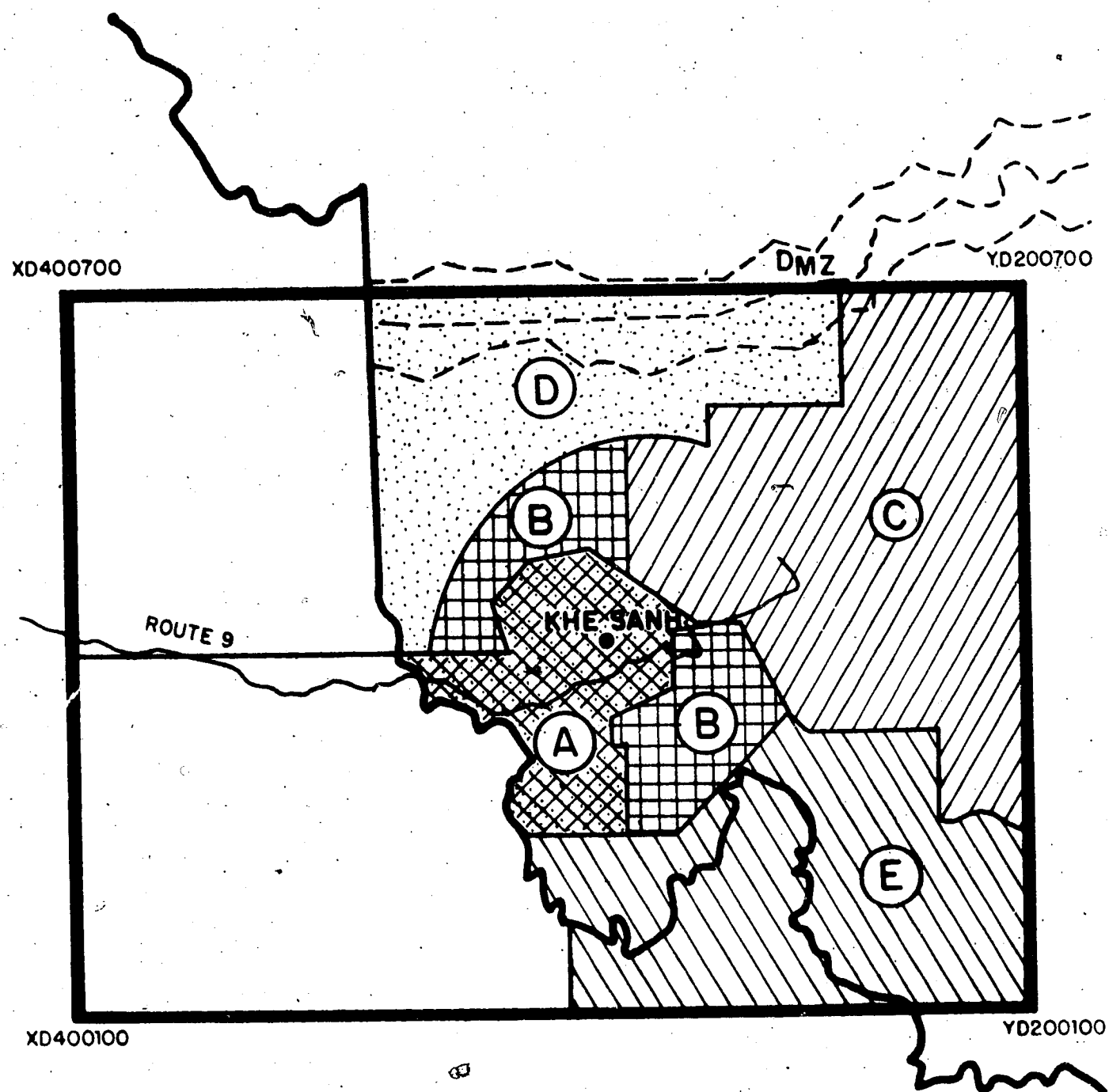
"Accuracy of drops has shown daily improvement, attesting to professional competence of air crews, GCA personnel and mission planners. Every effort being made to increase drop zone recovery capability and protect radars, in order to attain goal of 235 short tons daily. Progress hampered by enemy action and adverse weather."

By using the air drop modes, along with the navigational techniques discussed in the next section of this study, the 834th AD was able to keep Khe Sanh amply supplied under extremely adverse conditions. Mission Commander reports and other official documents revealed the following information which might enhance future planning of similar operations: ^{169/}

The 7AF Commander directed that fighter aircraft would escort all tactical airlift aircraft into Khe Sanh. Thus, air logistics operations received support from strike aircraft expending smoke, napalm, and diverse hard ordnance throughout the approach, ground-handling and take-off phases.

C-130s and C-123s provided the major effort, with the C-130s being the prime deliverer. A few C-7A sorties were flown, but it was determined that the

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FIGURE 17

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relatively small capacity of this aircraft was insufficient for the effort and risk involved, and its use was discontinued.

For coordination purposes, the Air Force sent 7-10 man airlift teams to Khe Sanh, for 10-14 days each. These teams controlled maintenance, offloading, onloading, and all supply aircraft in the area. They also marked the drop zones, coordinated deliveries, and served as back-up air traffic controllers with their own communications equipment.

Supply activities were limited to daylight hours, because night operations would present the enemy with too easily distinguishable targets. Also, the supply drop zone was much too vulnerable for night operations.

Aerial delivery did not completely eliminate the risks to aircraft. By monitoring ground to air transmissions, the enemy often discovered arrival times and were able to direct fire as aircraft began their runs.

Optimum airlift planning and response requires early determination of firm supply requirements in terms of tonnage by the ground commander. Firm requirements at Khe Sanh were not provided to 834th Air Division planners until two weeks after the airlift effort began.

Coordination and Control

In the planning and execution phases of Operation NIAGARA, both COMUSMACV and the 7AF Commander stressed close coordination between participating forces and optimum control of weapon systems being employed. In view of the great amount and variety of air and ground weaponry being