

major setback in his crowning campaign.<sup>256</sup> Hours after Lang Vei was overrun, he visited the III MAF headquarters in Da Nang for a special meeting. He had sent the Americal Division, the First Air Cavalry Division, a brigade of the 101st Airborne, and a South Korean Marine Corps Division to the ICTZ, but the pandemonium of the Tet Offensive seemed to have overcome the region. With two NVA divisions laying siege to Khe Sanh, another near the Rockpile, another fighting at Hue, and two more loose in the ICTZ, he did not believe the Marines were being active enough. Now that Lang Vei had been lost, he considered a major assault on KSCB imminent, and he took steps to assert greater control over the situation in the ICTZ. Westmoreland resolved to send his Deputy, General Abrams to the ICTZ with his MACV (Forward) headquarters, and decided to push once again for General Momyer's centralized control of all air assets in Vietnam.<sup>257</sup>

### The Nature of the Ongoing Siege

After the fall of Lang Vei, the NVA began to focus on Khe Sanh Combat Base itself.<sup>258</sup> KSCB had been subjected to regular bombardment daily since 21 January, but it intensified as Lang Vei was overrun, apparently to suppress American fire support for the Special Forces camp. Next, three companies of the NVA 101D Regiment

*A mortar impacts near some of the tents still standing after three weeks of bombardment.*



*An NVA rocket impacts the combat base during the period of peak bombardment in late February.*

ment moved into attack positions near the Rock Quarry outpost of 1/9. Their target was a smaller outpost set up on a knoll in front of the battalion, manned by one reinforced platoon to guard the western approach to 1/9. In the early morning hours, less than a day after Lang Vei had been lost, the NVA assault began. The Marines were caught completely off guard and were quickly pushed back into a small portion of their perimeter, but managed to hold the NVA off from completely overrunning the hill until the next morning allowed a relief force to set out, supported by an air strike. That force found 150 NVA bodies, while the Marines on Hill 64 had suffered 24 killed and only had 30 survivors.<sup>259</sup>

This event is significant because it is the last time the NVA assaulted one of the Marine outposts with the apparent intent of destroying it.<sup>260</sup> From this point on the siege was characterized by repetitive bombardments, concentrated attempts to sever the aerial resupply "bridge" supporting Khe Sanh, and trenching efforts focused on KSCB. Because the next two months lack any other assaults of significance, it is hard to be specific about the events that followed, but some of the general aspects of the siege warrant discussion.

The most immediate concern of the Marines



*Two Marines search for indications of NVA mortars firing on the combat base. The NVA indirect fire weapons were a very high priority for the Marines to find and destroy, but they were kept carefully hidden. While mortars had to be set up close to the base, and could sometimes be seen by ground observers, FAC(A)s were critical for finding the long-range artillery that fired from far beyond the normal visual limits of observers on the ground.*

was the constant bombardment they were subjected to by the NVA. The North Vietnamese hit the base almost daily with artillery, rocket, and mortar fire, so that the Marines never felt completely secure, and had to live with the constant threat of death. Incoming aircraft trying to deliver supplies and reinforcements, and evacuate casualties from the base, were fired upon on every single attempt. The Marines' problems with the NVA fire were compounded by the fact that the NVA artillery outranged the Marine artillery based at Khe Sanh. The largest American artillery was 155mm, and could reach only 15 kilometers from the combat base, compared to the NVA 130mm artillery which could reach almost twice as far.<sup>261</sup> KSCB was supported by the U.S. Army's heavy 175mm artillery based at the Rockpile and Camp Carrol 15 and 24 kilometers to the east respectively, but these guns could reach no further west than the Marine guns at Khe Sanh. The proximity of the Laotian border, meanwhile, gave

the NVA plenty of places to situate their guns near the Ho Chi Minh supply route, and imposed political restrictions on the American efforts to deal with them. The NVA sought to align their artillery positions along the long axis of the combat base to simplify their fire control problem. As a result about two-thirds of the rounds fired at the combat base flew over the westernmost Marine outpost on Hill 881S, from a distance of 12-14 miles from the combat base.<sup>262</sup> This made 881S a key location for providing the combat base with warning. Whenever rounds were fired overhead a Marine would radio back to the 26th Marines command post at KSCB, where a siren was sounded, giving the Marines at the combat base a few seconds warning before the rounds hit. Hill 881S was also important for dealing with the NVA rocket attacks. The range of the 122mm Katushka rocket was almost equal to the distance between KSCB and 881S, which meant any rockets to be fired from a position along the long axis of the base had to be set up near the outpost. Over the course of the siege more than 5,000 rockets were fired from that position,<sup>263</sup> which the NVA referred to as a 122mm rocket

*The remains of the original sick bay, built above ground but abandoned at the start of the heavy bombardments in January 1968.*



firebase. In a number of cases the men on 881S were able to spot the NVA loading the rockets into launching racks in preparation for a barrage. The Marines would wait until the racks were fully loaded, and then call in artillery or close air support missions to destroy them. In one case they waited just a little too long. When one A-4 rolled in to attack, the NVA fired the rockets fired directly in his face, bracketing the aircraft in its attack dive. By sheer luck the pilot and his aircraft escaped unharmed, and the flight spent the rest of its mission pounding the empty launcher to relieve their frustrations.<sup>264</sup>

The Americans set records with the fire support they devoted to the battle, but they were not the only ones. In the daily bombardments the NVA consumed huge amounts of ammunition, taxing their tortuous overland supply system. One the day of peak bombardment, 23 February, for example, some of the rounds fired did not even have fuses.<sup>65</sup> This did not mean that

the bombardment was easy to weather, however, with 1,307 rocket, artillery, and mortar rounds counted impacting on or near the base. Twelve Marines were killed, 51 were wounded, and another ammunition supply point was hit, consuming 1,600 rounds of recoilless rifle and artillery ammunition in a smaller replay of the first ammunition dump's explosion.<sup>266</sup> This was the largest NVA bombardment of the war to date, surpassing the former record of 1,065 rounds fired near Con Thien one day the previous July.<sup>267</sup> By no means did the daily bombardment drop off rapidly after the peak, either. That very same day more heavy artillery was detected moving towards the combat base, and the following day 130mm guns joined the fight for the first time.<sup>268</sup>

The Marines dealt with the bombardment in a number of ways. They kept their flak vests closed, and they always kept their eyes and ears open when moving about, looking for the nearest place to dive for cover while listening for the sound of

*Marines stacking empty 105mm artillery casings. The huge pile of empty casings illustrates not only the immense firepower being expended in the hills around Khe Sanh, but also the incredible logistics demands of such efforts, all of which had to be supplied by air. Many Marines used empty casings filled with dirt to create additional protective layers for their bunkers.*





*One means of dealing with the stress of constant bombardment was a macabre sense of humor, which many Marines expressed on their helmets. Also on the side of this helmet are the Marine's initials and the last four digits of his service number, to aid in identification.*

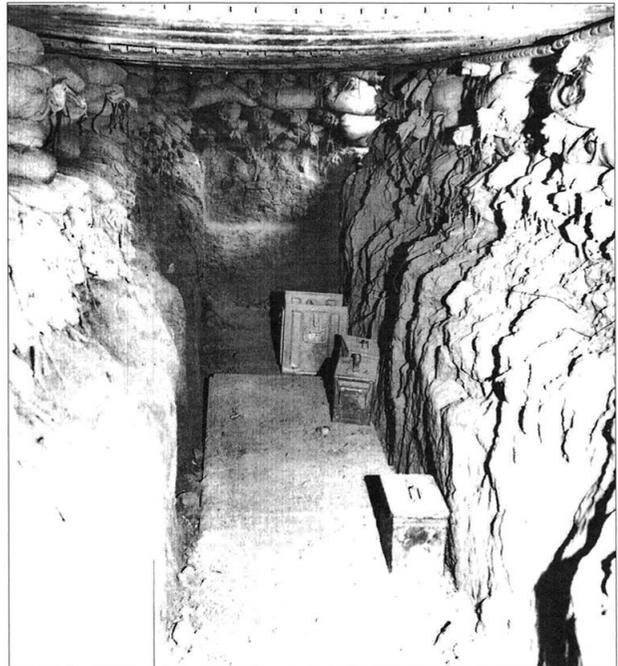
incoming artillery, rockets, or mortars.<sup>269</sup> If aware of incoming rounds, they would adopt a posture that became known as the “Khe Sanh Shuffle,” a bent-over crouch while running for cover. They also reinforced their bunkers with anything and everything they could find—empty artillery shell casings filled with the red mud of the plateau, timbers stolen from the Seabees, and even steel and aluminum cargo pallets stolen from the Air Force cargo handling team. When bombardments occurred, however, the Marine artillery men always tried to fire back, even when they knew the enemy was out of range. It was considered vital for the defender’s morale for their artillery to be heard firing back, so that every man would not have the feeling he was just sitting still and taking beating, waiting for death to find him.

When enemy positions could be located near the combat base they were frequently engaged with counter-battery fire by the Marine artillerymen, but the preferred weapon for finding and locating the enemy guns was aircraft, which were

not subject to the same range limitations. The FSCC was ruthless in targeting known and suspected artillery, rocket, and mortar positions, but very often it was only the eyes of a FAC(A) which could find the enemy guns. When they did, the results were deadly for the NVA, whose guns were not mobile enough to escape, and were very vulnerable to air attack when spotted. When the Marines did enjoy a respite from the bombardments, they gave at least some of the credit to the air support they were receiving. After a remarkable two days without incoming on 20 March, one Marine chalked it up to “A-Number-one air support.”<sup>270</sup>

The most vulnerable aspect of the siege was the tenuous air bridge upon which the 26th Marines relied for supplies and reinforcements. After the detonation of the ammunition depot in the early hours of 21 January the combat base’s runway was closed for two days as the Marines

*Marines constantly improved their defenses during the siege. Extensive portions of the trench line were equipped with overhead cover.*

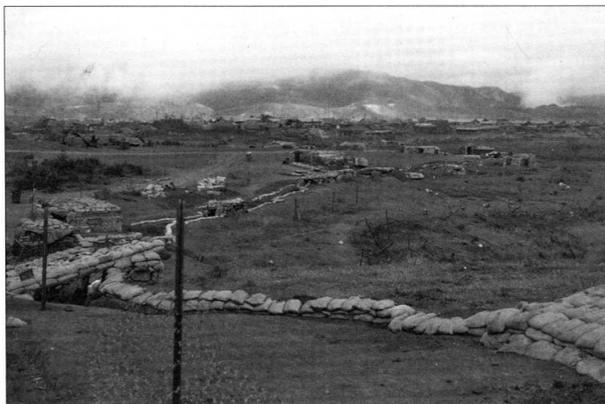




*Two Marines digging new trench line with picks even as the siege of the combat base was coming to an end. The work of improving the defenses was never considered complete.*

rushed to conduct repairs and clean up the hot, unexploded ordnance scattered everywhere. Working from just a tiny fraction of the reserves that had been so carefully stockpiled, the Marines were happy to welcome the first fixed-wing cargo transport which landed on 23 January.<sup>271</sup> The combat base and its outposts consumed a huge volume of ordnance and supplies on a daily basis, and the daily NVA bombardments were inflict-

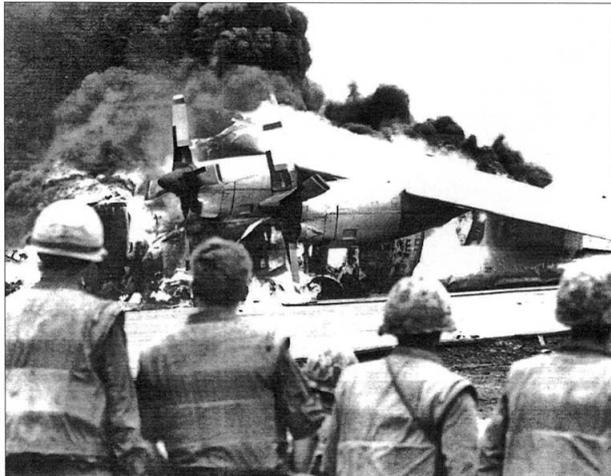
*The western perimeter of Khe Sanh Combat Base, defended by the 1st Battalion, 26th Marines. Although in this picture visibility has cleared, the persistent clouds that made air operations so difficult around Khe Sanh can be seen in the background.*



ing casualties which had to be evacuated and replaced. Unfortunately, the NVA were equally anxious to greet arriving and departing aircraft with rocket and artillery fire. The NVA apparently had forward observers well positioned to observe the airfield, because veterans unanimously state that every single aircraft that landed at Khe Sanh during this period was attacked by artillery or mortars. Before long, none of the arriving aircraft came to an actual halt anywhere within the combat base. While they had formerly taxied clear of the runway to allow forklifts to unload their cargos in a process that would take half an hour or more, now the aircraft landed and turned around on the runway. To dispense their cargo the loadmasters unleashed entire pallets from their restraints so that they simply rolled out of the back of the taxiing aircraft onto the runway. Anyone departing Khe Sanh had to run and board the moving aircraft as it taxied down the runway to begin its takeoff, passengers on board or not. Helicopters followed similar procedures, avoid-



*Despite the regular bombardments that drove the defenders underground in elaborate bunkers, essential flight support services were provided continuously. In the foreground is the airfield fire truck used to extinguish fires started by the bombardments, and in the background are the antennas and bunkers of Marine Air Traffic Control Unit-62, responsible for coordinating the many arrivals and departures of aircraft with as much safety as the enemy situation allowed.*



*Marines watch the burning wreckage of a KC-130 that crash-landed on the airfield on 10 February. Piloted by Chief Warrant Officer-3 Henry Wildfang and Major Robert E. White Jr., the aircraft was hit by NVA heavy machine gun fire on approach to Khe Sanh, igniting the bulk fuel bladders inside. Despite heavy smoke and flames in the aircraft, the pilots managed to land the C-130 and got it off the runway to keep the airfield open. As the aircraft was engulfed in flames, the pilots escaped out the cockpit windows. Three other Marines made it away from the burning wreckage, but ultimately 8 of the 11 men on the plane perished. The wreckage became popular among reporters visiting the base to use as a dramatic backdrop while recording their stories.*

ing the artillery and mortar fire by staying constantly in motion. Teams of Marines ran up the boarding ramps to unload boxes of supplies and bring casualties on stretchers aboard, so that the helicopters never had to stop in a running drop-off and pick-up.<sup>272</sup>

In February, the situation grew worse for two reasons. The unseasonably good weather which had graced the Marines during the last days of January was replaced by the low-lying crachin rain clouds, shrouding KSCB in mist. The runway itself had already been considered marginal due to the mountain winds that flowed through the area, but the crachin now made it completely unsafe to operate there.<sup>273</sup> The Marines guided air-

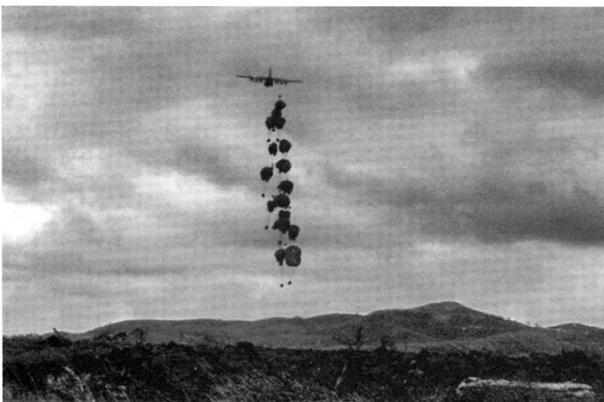
craft to landings using a ground-controlled radar approach, but pilots routinely had to violate the safety standards that normally applied to such procedures in order to get to the base.

The second major problem the cargo pilots had to face at Khe Sanh was enemy anti-aircraft fire. The NVA sought to sever the air bridge at Khe Sanh, just as they had succeeded in doing at Dien Bien Phu. To do the job, they brought in anti-aircraft artillery of up to 37mm, which was emplaced as close to the combat base and the aircraft approach corridors as possible.<sup>274</sup> During the worst weather, the NVA fired blindly into the clouds at the sounds of landing aircraft being guided in by the Marine radar. During the breaks when cargo aircraft rushed to exploit momentarily good visibility, the NVA were able to accurately target the large aircraft as they came in low and slow to land. By the 10th of February, when a Marine C-130 full of fuel bladders was hit on final approach and burned on the ground after a heroic landing, 10 Air Force C-130s had been hit. When two more were hit on 11 February, General Momyer decided that he had had enough. He issued a prohibition against any more C-130s landing at Khe Sanh beginning 12 February. For the delivery and pickup of personnel and sensitive cargo at Khe Sanh, the Marines were now dependant on the smaller C-123K and C-7A transports, capable of carrying 5 and 3 tons respectively, compared to the 13-ton payload of the C-130.<sup>275</sup>

Concurrent with the increasing risk, Khe Sanh reached its highest logistic demands in February. The Marines could simply not do without the support of the larger C-130s. The Air Force responded by using three other cargo delivery techniques, which ultimately accounted for two-thirds of the cargo it delivered.<sup>276</sup> The first was the Ground Proximity Extraction System (GPES), in which the cargo pallets loaded in the back of the aircraft were attached to a "tail hook" that hung off the back of the cargo ramp. The aircraft

would approach the runway as if about to land, and level off just two or three feet above ground level, allowing the hook to catch an arresting cable stretched across the runway. The arresting gear would then pull the cargo out of the back of the plane as it flew down the runway. This method did not prove effective at Khe Sanh because the arresting gear, which the Marines had struggled to install under constant artillery and rocket barrages, had not been sufficiently secured into the ground. When the first GPES delivery was attempted, the load was pulled from the aircraft, but it also pulled the arresting gear out of its mounts, and the entire system went skidding down the runway. As an alternative, the Air Force tried a second system, the Low Altitude Extraction System (LAPES). In this technique the aircraft would fly a similar profile, but deploy a drag chute to pull the cargo out of the aircraft flying a few feet off the ground. The problem with this system was that the drag chute had to be deployed at exactly the right time, and any malfunction could result in the cargo landing somewhere other than was intended. This is exactly what happened on

*Once antiaircraft fire proved too heavy for frequent landings at the airfield and other delivery means were proven impractical, Khe Sanh Combat Base was primarily supplied by airdrops from C-130s. A flat area between the combat base's western perimeter and the outpost manned by 1st Battalion, 9th Marines near the Rock Quarry served as the drop zone.*



9 March, when a load was released late. The nine tons of cargo, traveling at more than 100 miles an hour, went skidding off the end of the runway and into the base's defensive perimeter, demolishing a bunker and killing one Marine. Another fatality on 21 February was enough to convince the Air Force to try another technique, parachute drops outside the base perimeter. Because of the success of this third method, LAPES deliveries were reserved for only the most sensitive cargo that could not be risked falling into enemy hands.<sup>277</sup>

The Air Force crews became quite skilled at delivering their cargo by parachute drop, being careful not to repeat the errors of Dien Bien Phu. There, the French had delivered a significant amount of supplies to the NVA rather than their own forces. At Khe Sanh, the drops were made to a level area between the main combat base perimeter and the Rock Quarry outpost to the west held by 1/9. The Marines swept this area for booby traps every morning before any drops began, and kept working parties ready to recover paratropped supplies, usually under NVA harassing fire. In the cases when the supplies could not be recovered by dark, the Marines called in artillery to destroy them, thereby preventing them from falling into enemy hands. By 15 March, the 852 airdrops made in support of Khe Sanh exceeded the total number of all drops made in Vietnam before the siege began.<sup>278</sup>

Resupplying the outposts was another matter. Because they were too small for runways and did not have secure drop zones nearby, the hill outposts had to be supplied by helicopter. Much like at Khe Sanh, these deliveries touched down for only moments to load and unload, but were still subject to constant mortar fire. At the outposts they faced the added danger of heavy machine guns hidden outside the Marine perimeters. In order to reduce the risks of multiple landings under fire, the helicopters stopped carrying supplies from KSCB to its outposts. Instead, the cargo was



*Although helicopters like this CH-46 Sea Knight, shown here on 23 January, were used to ferry supplies to the main combat base, they were most critical in resupplying the hill outposts, which were too small for the delivery of supplies and reinforcements by any other means.*

loaded at one of the coastal bases and carried directly to the hill outposts, bypassing the combat base. The Marines also developed very sophisticated fire support plans to protect the helicopters as they arrived at the hill outposts.

The 26th Marines FSCC gave antiaircraft positions a very high priority in targeting, and once a 37mm position was identified, it was repeatedly attacked until it was destroyed or abandoned.<sup>279</sup> By the end of the siege, the Marines reported that more than 300 had been destroyed, but not without cost. Thirty-three helicopters had been shot down or permanently disabled over the course of the siege. The poor February weather also provided the NVA with concealment to move more AAA into the area immediately around the base. When the weather cleared on 6 March, they managed to shoot down an Air Force C-123.<sup>281</sup> Overall, however, the effort was a success meeting an average daily logistic requirement of 150 tons of supplies. As shown in Figure 4, the bulk of these supplies (72 percent) were delivered by the Air Force, the

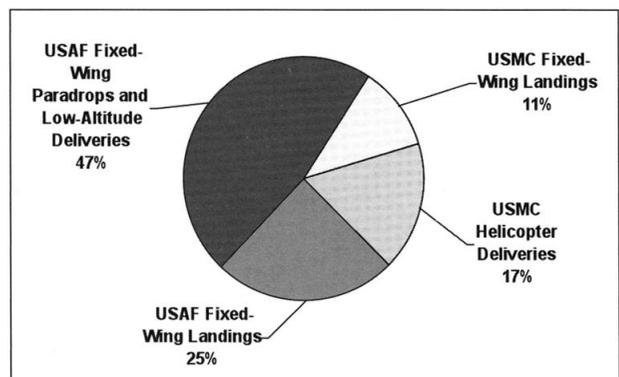
majority of which was by using new and innovative methods. In this respect, air power was a very critical element of the American victory at Khe Sanh, and air-centric historians like Donald Mrozek and Bernard Nalty are entirely correct to celebrate the importance of Air Force contributions. When it came to contributions of offensive firepower, however, it will be shown that the score was quite different.<sup>282</sup>

### The NVA Siege Trenches

Sometime after the final assault on 8 February, the NVA apparently turned to more deliberate means of attacking the combat base. While the Marines waited for a final assault that never came, the NVA used the cover provided by poor weather to dig siege trenches near the combat base's perimeter. NVA trenches had already been located more than a kilometer south of the base on Hill 471, but when the fog cleared on 25 February, the Marines were alarmed to hear from an aerial observer that trenches had been dug as close as 25 meters outside the perimeter. More than 700 meters of trench appeared to have been dug the previous night.<sup>284</sup>

The trenching was ominous because the same technique had proven very successful for the PAVN at Dien Bien Phu. The Marines responded by redoubling their efforts to stop the NVA from

*Figure 4. Aerial logistics deliveries to Khe Sanh and its outposts, by service and delivery mode.<sup>283</sup>*



digging any closer or putting the siege trenches to good use. Artillery and aircraft were concentrated on the trenches, but they proved frustratingly hard to destroy, despite a number of creative solutions that were tried. To make matters worse, the NVA were digging faster than the trenches could be destroyed. On one occasion they completed more than 1,700 feet of trench in one night, all of which was deep enough for a man to stand up in without being exposed.<sup>285</sup> The most effective solution proved to be abandoning attempts to destroy the trenches, and instead they were covered with fire by Air Force gunships that constantly orbited overhead.

Although the Marines expected a massive attack by the NVA, one never materialized. On the 29 February, electronic sensors detected the approach of what was suspected to be an NVA regiment moving from Lang Vei past Khe Sanh village. Colonel Lownds put his men on full alert, and his FSCC targeted the estimated location of

*As the NVA dug trenches within 100 meters of the combat base, Marines kept close watch for enemy movement that could be targeted by artillery, mortars, or aircraft.*



the approaching enemy with artillery, mortars, radar-guided tactical aircraft, and even two B-52s diverted to drop within 800 yards of the combat base. Whatever the cause, an attack in force never materialized. Early the next morning of March, 78 NVA attacked the combat base perimeter at the southeast sector manned by the ARVN rangers, but they failed to penetrate the lines.<sup>286</sup>

It was not long after this that the NVA apparently ceased their siege efforts. Robert Pisor concluded that as early as 6 March, even Westmoreland had decided that the NVA had turned their attention elsewhere. If this is true, the evidence is not clear, but it cannot be far off. On 9 March, Westmoreland told President Johnson that there were only 6,000 to 8,000 NVA left at Khe Sanh, and the next day he reported that they had stopped repairing their siege trenches. Six more minor assault attempts did materialize over the course of March, including one on the night of the 13 to 14 (the 14th anniversary of the victory at Dien Bien Phu),<sup>287</sup> but each one seemed concentrated on the ARVN lines on the southwest perimeters (which Lownds regarded as an obvious weak point), and each was destroyed with artillery and air bombardment.<sup>288</sup>

The various air components continued to take advantage of the improved weather. As the month wore on, NVA activity declined and the tone of the propaganda being delivered to the local population changed, now indicating the NVA were no longer interested in wasting their time on only 6,000 Marines.<sup>289</sup> On 21 March, Colonel Lownds decided to investigate what had happened to the enemy, and a platoon from B/1/9 was sent out, supported by more than 1,300 rounds of artillery. Combined with close air support, this provided the company with a continuous shield of destructive fire. The only sign of the enemy was a few mortar rounds that were fired at the patrol, which were quickly silenced by supporting arms.<sup>290</sup>

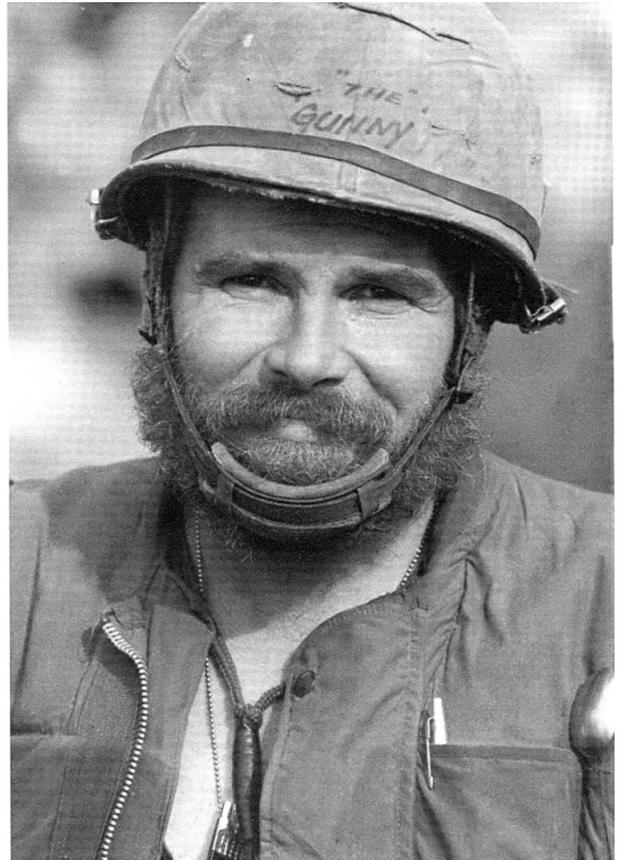
That same night, there were indications that

the enemy was massing for attack once again, and one of the ammunition supply points on the combat base was again hit during a heavy bombardment. The assault, however, never materialized, and the enemy activity rapidly faded with the arrival of an AC-47 gunship.<sup>291</sup> In a final act of defiance, the NVA delivered an uncharacteristically heavy bombardment the next day—more than 1,000 rounds—but never again gave indications that they were preparing to attack.

Recognizing that they might be able to gain the initiative, the Marines began to plan their first offensive ground operation since the siege began. A company-sized patrol stepped off on the morning of 30 March. Fog and low ceilings prevented the use of aviation support, but more than 2,600 artillery rounds were fired by noon in support of the attack. The enemy was waiting for the Marines to come out, and brought them under heavy fire. The company commander was unable to back off and employ supporting arms to reduce the enemy resistance as was the Marine fashion, because his men were filled with such a blood lust he could not hold them back from close combat with the NVA. For many of the Marines, these were the first enemy they had actually laid eyes on since the siege began. After returning to KSCB, the Marines ultimately claimed a total of 115 dead NVA at a cost of 9 Marines killed, 71 wounded, and 3 missing.<sup>292</sup> As the enemy withdrew in the following days, it became obvious that siege had ended, but the operation would not be declared officially over until the Marines had been “rescued” by the Army.

### Was Khe Sanh Ever Really Under Siege?

Typical of the men at Khe Sanh were the experiences of I/3/26 on the important outpost of Hill 881S. Commanded by Captain Bill Dabney, this unit was probed and invested, but never subjected to any serious assault by the NVA. Daily bombardment and harassing sniper fire, on the other hand, inflicted nearly a 100 percent casu-



*Gunnery Sergeant R.L. DeArmond of I Company, 3d Battalion, 26th Marines on Hill 881S, at the start of April. The westernmost outpost on Hill 881S was so isolated and hard to resupply by air that the Marines were permitted to stop shaving in order to conserve water.*

alty rate from 21 January to 1 April 1968.<sup>293</sup> Air power was a vital component to the defense of Dabney’s position, more than 300 CAS missions having been controlled by the Marines on the hill. Despite all of this, Captain Dabney was clear in his conclusion that Khe Sanh and its outposts were never really under siege. Since the Marines were able to reinforce and resupply themselves with regularity, and could have withdrawn at any time they desired, Dabney concluded that they were surrounded, but were not besieged.<sup>294</sup> The notion that Khe Sanh was never under siege was also advanced by Defense Intelligence Agency

analysts at the time of the battle,<sup>295</sup> and by some very informed veterans and historians after the battle. Lieutenant General Krulak wrote that although the appearance of a siege had some political advantages for General Vo Nguyen Giap, in an operational sense, "Khe Sanh cannot have meant more to Giap than a convenient mechanism for drawing the Americans away from the populated coastal area."<sup>296</sup> He added, "the North Vietnamese had no intention of undertaking an all-out assault on the base.... Instead, during the Tet period they elected just to hold at Khe Sanh, keeping pressure on its hill outposts and shelling the base proper, while putting their prime offensive effort on the coastal cities."<sup>297</sup> Edward F. Murphy, a historian of Marine operations in the Vietnam War, described the NVA operation at Khe Sanh as a "feint."<sup>298</sup> Elaborating on this idea, Vietnam veteran and historian Lieutenant General Dave R. Palmer went so far as to say General Giap "never had any intention of capturing Khe Sanh. His purpose there all along had been to divert Westmoreland's attention and resources. Khe Sanh was a feint, a diversionary effort."<sup>299</sup> Such revisionist interpretations suggest that the NVA never did commit 20,000 men in a deliberate attack on Khe Sanh, but instead sought only to commit the minimum forces necessary to present the appearance of a siege. The true NVA goal, under this theory, was to draw combat power away from the coastal plains, and distract MACV's attention during the Tet Offensive. If one accepts that this was the North Vietnamese goal, the longer Khe Sanh remained in American hands, the longer it served its purpose for the NVA.

Dabney stated that Khe Sanh was not considered a siege at the time, and the word was not used until after the battle was over.<sup>300</sup> This may have been true on his outpost, but it was certainly not true for the men who fought the battle, and the press that was following it. Both sides were attracted by the analogy between Khe Sanh and Dien Bien Phu, and the word "siege" was a fre-

quent part of their exchange on the subject. The average Marine at Khe Sanh, for example, was not nearly as thoughtful as Dabney on the subject. These Marines knew they were surrounded by an enemy who apparently wanted to get into the combat base, who was trying hard to sever their air logistics bridge, and who was keeping them penned inside.

The issue of NVA intent may never be known with a high degree of accuracy, but most sources suggest that the North Vietnamese would have taken Khe Sanh if significant resistance had not been encountered. The official NVA history of the war as translated by Merle L. Pribbenow discusses the strategic goal of tying down mobile forces at Khe Sanh that would otherwise be used to suppress the general uprising in the Tet Offensive, but pairs it with another goal of annihilating large numbers of U.S. troops in the highlands. It notes that the NVA was very successful in the first mission, but that its preparations were inadequate and U.S. air power too strong to permit the North Vietnamese to engage the defenders of Khe Sanh in a large battle for a decisive victory.<sup>301</sup> This general assessment is corroborated by several other official NVA sources.

It is true that the NVA viewed Khe Sanh as part of a much larger battlefield than the Americans typically described it. In June 1966, they established a new strategic area for their war effort, the Route 9 Front, which stretched along the entire northern portion of the ICTZ. The original strategic objective of this front was to force their enemies to disperse into the mountainous regions where the NVA could attrite them, and in the process relieve some of the pressure being applied against the insurgency in the populated lowlands.<sup>302</sup> The NVA were successful in attracting attention and drawing Marine forces in the ICTZ westward. The increased contact that resulted from Operations Hastings and Prairie in 1966, incidentally, was part of what led Westmo-

reland to push the Marines to begin using infantry battalions to patrol from the reconnaissance base at Khe Sanh that same year. Pleased with its success in enticing forces westward, in December 1967 the NVA issued new instructions for the front, now under the direction of a new headquarters known as B5-T8, located just west of the border in Laos. In the context of moving the war into a new phase, the Tet Offensive, the specific mission for the command was "to eliminate a large number of American and South Vietnamese personnel, primarily Americans if the conditions presented themselves, destroy a part of the enemy's defensive line on Highway 9, and to continue into other areas around Tri-Thien Hue, to draw in American and South Vietnamese forces from other battlefields."<sup>303</sup> While the relative priorities of these objectives may seem somewhat open to interpretation, the plan also included a quota to eliminate at least 20,000 enemy troops (primarily American), and specified that it should draw in two American divisions and the better part of a South Vietnamese division.<sup>304</sup>

The NVA divided the Highway 9 front into two battlefields, east and west. The western one around Khe Sanh was designated the focus of effort, committing two of the three divisions at the NVA's disposal, the 304 and the 325C Divisions (which had begun operating in the area in 1967). The Joint High Command then ordered attacks to begin approximately one week prior to the first day of Tet with the specific intent of creating a timely diversion of forces from the rest of South Vietnam.<sup>305</sup> The NVA built some flexibility into their plan so that if too much resistance was experienced at Khe Sanh, or the small-scale attacks in the east on targets like Cam Lo produced unexpected success, the priority of effort could be shifted eastward.<sup>306</sup>

While the credibility of these official histories with respect to intent may be suspect, the deployment of forces to execute such a plan is

confirmed by NVA logistics documents. These show that there were indeed two divisions committed to the region around Khe Sanh, and that there was at least one more division providing support from Laos. These documents also show that the NVA presence peaked in mid-February, and began a steady decline in early March,<sup>307</sup> just as U.S. intelligence sources perceived at the time. Approximately half of the NVA combat power on the Route 9 front was invested in the attack on Khe Sanh, totaling as many as 29,000 soldiers in February (not including rear service personnel). They were supported by almost 300 heavy mortars, artillery pieces, and rocket launchers, and almost 200 antiaircraft artillery pieces.<sup>308</sup>

The operational plan for B5-T8 at Khe Sanh was to eliminate the outlying positions around the combat base, and then surround KSCB itself and cut off its source of supply. This would either lure in a relief force which could be ambushed in its counterattack, or force the 26th Marines to attempt a break-out, where they could then be destroyed outside their fortifications.<sup>309</sup>

According to NVA histories on the battle, the North Vietnamese never intended to launch a protracted siege of Khe Sanh Combat Base, gradually reducing the defenses until KSCB was forced to capitulate. They instead describe that "Attacking the enemy outside their fortification was primary, attacking the enemy when within their fortifications when necessary and victory was certain."<sup>310</sup> This reveals that a protracted and costly siege was clearly something the NVA wanted to avoid. These sources further stress that "it was imperative to stop supplies [from reaching Khe Sanh] in order to draw the enemy in; if conditions were favorable, then liberate Khe Sanh,"<sup>311</sup> clearly showing that capture of the combat base itself was not a primary operational objective, although it might be a positive by-product within reach if the rest of the plan allowed them to destroy the preponderance of

U.S. forces sent to protect or relieve and Khe Sanh.

The histories indicate that the seizure of the actual combat base was only a secondary objective, but this distinction was lost to the NVA troops. The NVA histories admit that their soldiers, like many Americans, began comparing Khe Sanh to Dien Bien Phu, which is no surprise since participation in that victory was probably the proudest moment in the 304 Division's history. While the NVA command examined the historical analogy more critically, recognized the American advantages, and determined that even an encirclement without a deliberate siege would be a difficult mission to accomplish,<sup>312</sup> the point is moot. Whether or not the NVA intended to conduct a sustained deliberate siege or merely a diversion for Tet, there is no doubt that the NVA intended to destroy large numbers of American troops, they invested an immense amount of manpower and firepower for that objective, and would have accomplished their goal, potentially including the capture of Khe Sanh, if the Americans had not resisted so fiercely. Such a strategic victory with the echoes of Dien Bien Phu could have had a decisive effect on the war, especially if it occurred simultaneous with the Tet Offensive.

Some revisionist North Vietnamese accounts attempt to obscure the matter, since no such victory was obtained. The NVA history on the campaign written in 1987 states,

the Highway 9 Khe Sanh Offensive ended in victory, completing the mission the High Command had assigned: eliminating and capturing many of the enemy forces (primarily the Americans), destroying much war material; destroying a large section of the enemy's defensive line to the west of Highway 9; and in particular drawing in and tying down an important force and a large quantity of aircraft ordnance of the Americans into the

Highway 9 Khe Sanh area over a protracted period of time, creating conditions that were favorable for the entire battlefield in south Vietnam first of all for (support of) the attack against the enemy in Tri-Thien-Hue.<sup>313</sup>

This assessment is far from accurate. While the capture of Lang Vei and the approximately 3,000 casualties inflicted at KSCB and its outposts may have been significant compared to other NVA victories in the war against the Americans, the losses were a small portion of the American force committed and fell far short of the quota to eliminate 20,000 of the enemy. While the defense of KSCB did occupy a reinforced regiment of Marines and a substantial amount of combat power in logistics, artillery, and attack aviation, none of these assets would have been decisive in other parts of South Vietnam, where the Tet Offensive failed in its operational objectives anyway. To say that this campaign was especially beneficial for the attacks in the eastern portion of the Route 9 Front also involves some questionable logic; these were considered smaller, secondary attacks, and were quickly defeated except for the stubborn resistance at Hue. The NVA certainly did not succeed in drawing in almost three American and South Vietnamese divisions, as they planned. The force sent to relieve Khe Sanh, built around the 1st Air Cavalry Division, was not sent until April, when any danger of Tet was well over and the preponderance of NVA forces had already been withdrawn from the area around Khe Sanh.

The question remains, then, why did the NVA retire in mid-March without accomplishing their objectives—because they had been beaten back in a severe pounding by American air power, or because the Americans held out and did not expose a large mobile relief force, making the NVA encirclement pointless? Only 1,288 NVA bodies were reported as visually confirmed killed by air (KBA) over the course of the operation, but this does not mean that many more were not killed.

Considering the range from the static Marine defenses at which many air attacks occurred, and the awesome destructive potential of the B-52, there was no definite way to observe and quantify the effectiveness of Operation Niagara. In order to measure the effectiveness of air power, the Americans unfortunately resorted to the questionable assumption that ordnance expended and secondary explosions observed was proportional to the damage inflicted upon the enemy. MACV's evaluation section applied three different mathematical models to ordnance expenditure reports, secondary explosion observations, and estimated enemy concentrations to deduce the number of NVA killed. The final tally estimated that 28,900 NVA soldiers had been killed or sustained injuries serious enough to make them combat ineffective. The report admitted that this was nearly twice the number of NVA believed to be in the region in the first place, but explained that the NVA had been able to partially replace their losses.<sup>314</sup> Since these calculations told them that many NVA had been destroyed, it was logical for Westmoreland and many others to conclude that the air power they had massed for the battle had been decisive. This conclusion led to numerous triumphalist claims in the years after the battle that two divisions of the NVA had obligingly presented themselves for destruction by air power at Khe Sanh, just as the Americans designed.

Regardless of what the Americans believed had happened, the NVA unit histories show that even if capture of the combat base in a siege was not the primary goal, American air power had a large impact on their decision making. The first phase of the battle was designed to eliminate the western outposts and open Route 9 to larger forces, which could then move in and surround KSCB, to both isolate the base and lay in wait to ambush any counterattacks. This phase began with the assaults on the night of 20-21 January, but by noon of that next day, the assault elements of the 304 Division were withdrawn after suffer-

ing heavy casualties in air strikes.<sup>315</sup> When after three days the Americans proved unwilling to expose themselves in a counterattack, the NVA leadership decided to capture Lang Vei, more completely surrounding Khe Sanh and hopefully provoking a response. This task was completed on 7 February,<sup>316</sup> but in the process of concentrating their forces for this effort the NVA again suffered heavy casualties. One battalion of the 304 Division was devastated by B-52 strikes on 6 February. Even the triumphalist NVA account admits inflicted nearly 200 casualties and caused such severe morale problems (manifest in desertion and self-inflicted wounds to avoid combat) that the parent command doubted the battalion could be used again.<sup>317</sup>

With Route 9 open, the NVA were able to move on to Phase II, the close encirclement of the combat base. This phase began on 10 February, with the NVA committing the bulk of its forces to the main effort of isolating KSCB and cutting its vital air bridge, while smaller units were deployed around the American outposts on Hill 881S and Hill 861. It was during this phase that the battle most resembled a siege for the NVA. They settled into more static positions and dug trenches toward KSCB, and organized several assaults that were unsuccessful.<sup>318</sup> As they suffered severe losses to American supporting arms, many frustrated NVA soldiers came to forget that their true objective was not the capitulation of the combat base. The 304 Division's official history stated,

"The morale of the cadre and troops of the Division during this period of time began to exhibit condition [sic] that were based on practical situations created on the battlefield. The troops felt that we had the ability to liberate Khe Sanh so why did the higher command not order an attack? Why continue an encirclement day after day and permit the enemy artillery and airstrikes to cause mounting casualties? ...we were in

control of the battlefield, and if the higher command ordered an attack to overrun Khe Sanh, we could do it. There were those who asked the question: "Who knows how much longer the higher headquarters will wait before giving as a gift to Johnson a Dien Bien Phu in Khe Sanh?"<sup>319</sup>

Even as the political cadre reminded their men that their mission was actually to draw in as many Americans as possible, NVA leaders had already come to the realization that they could not sustain the same level of combat effort, and had ordered the withdrawal of the 325C Division to be refit and redeployed to the central highlands.<sup>320</sup>

The casualty statistics in the NVA histories support the analysis that the NVA were suffering too heavily for the payoff they were receiving. They show that by the time the 325 Division left the area on 7 March, it had sustained 15.27 percent casualties. The 304 Division, which remained at Khe Sanh for the duration, suffered more than 38 percent casualties.<sup>321</sup> NVA casualty reports confirm this, showing that the collective forces near Khe Sanh sustained 33 percent casualties during this period.<sup>322</sup> Of note, according to the NVA the majority of these casualties were inflicted by air power. In the 304 Division, 59 percent of combat casualties came from bombs. One of its regiments, which sustained only 37.8 percent casualties from air strikes during mobile operations, saw that percentage rise to 62.3 percent during the encirclement.<sup>323</sup> Interrogations and captured NVA documents from the battle showed that they feared American air power above all else.<sup>324</sup>

The NVA were ready to call Phase II complete by March 31st. Although their official history suggests a high degree of satisfaction with "Phase III—Attacking the Enemy Relieving the Siege (1 April to 7 May 1968),"<sup>325</sup> it should be noted that the relief effort was begun by the Americans only

when NVA movements indicated that they had lost interest in the siege. When that relief effort began, the NVA no longer had sufficient forces in the area to destroy an American counterattack, as they originally planned.

While it may never be known with certainty if the NVA intended to conduct a sustained, deliberate siege with the intent of forcing Khe Sanh to capitulate, and were therefore defeated by air power, at the time the Americans had every reason to believe that another Dien Bien Phu was being attempted. The political stakes for both sides were just as high, and the intensity of the bombardments and antiaircraft fire attempting to sever the air bridge left little room to underestimate the enemy effort. Even Lieutenant General Krulak, who warned Westmoreland that nothing would be gained by holding the base, and who afterwards described the NVA attack as a diversion, admits to calling it a siege at the time.<sup>326</sup> The defenders of Khe Sanh fought the battle as a siege, preparing for an imminent assault, and seeking only to survive inside the base, while aviators and artillerymen searched for and attacked the enemy. The NVA were foiled in many, if not all, of their objectives because the American plan did not play to NVA strengths as the enemy had hoped. The NVA plan, meanwhile, did play to American strengths, just as Westmoreland had hoped, and as a result large numbers of NVA died, and the defenders of Khe Sanh were safe. Even if conservatism requires that the terms "siege" and "victory" be avoided when describing the outcome of this battle for the Americans, despite revisionist claims, the NVA were indeed defeated. NVA plans were foiled by the Marines' ability to remain in a sanctuary and suspend mobile operations until enemy forces in the area had been significantly reduced. Air power was the key element in destroying enemy forces and convincing them to withdraw before they had obtained their objectives.



# OPERATION PEGASUS AND THE RELIEF OF KHE SANH

Preparations for the relief of Khe Sanh had begun only days after the siege was finally initiated, on 25 January 1968. Westmoreland had sought the battle as a means of introducing more combat troops to the area, and must have been relieved that the NVA had decided to take the bait and present themselves for destruction by air power. The relief operation, code-named Pegasus, was designed to capitalize on the imminent destruction of the main NVA combat divisions around Khe Sanh by sweeping through the area with mobile forces to destroy what NVA remained. The planning for this operation, however, had to be put on hold when the Tet Offensive erupted just a few days later on 30 January. The MACV staff was soon consumed with fighting that battle, and forces which had been moved north to establish new firebases for offensive operations in the northern ICTZ were diverted to the more immediate task at hand. By 16 February, with Tet under control, planning resumed for the follow-through at Khe Sanh.<sup>327</sup>

As has already been shown, by the second week in March Westmoreland decided that the enemy had "given up, his attempted repeat of Dienbienphu an abject failure."<sup>328</sup> On 10 March, COMUSMACV convened a conference in Phu Bai where he made a number of fundamental changes to facilitate not only an operation to clean up the NVA around Khe Sanh, but also to set the stage for his planned follow-through into Laos. The first thing he did was to reorganize the major combat units in I Corps to increase the Army's supervisory role in this key area of operations. Where the 3d Marine Division had formerly run the war along the DMZ, answering directly to III MAF, Westmoreland now took the MACV(FWD) headquarters he had sent earlier in the battle and converted it to a new organization to run the war in Quang Tri province and most of Thua Thien for III MAF. This headquarters, known as Provisional Corps Vietnam (PCV), was to be commanded by Lieutenant General William B. Rosson and had

three major ground combat units: the 3d Marine Division, and the Army's 1st Air Cavalry and 101st Airborne Divisions.

Westmoreland explained the move by stating merely, "In essence, PCV was established to provide closer supervision over the growing U.S. forces and combination with the Vietnamese forces in the northern area."<sup>329</sup> In view of his dissatisfaction with General Cushman before the siege began, and his continued frustration with 1st MAF in the single management controversy, however, it is not surprising that MACV inserted an Army general as the immediate commander of the northern war effort. Despite this, Cushman kept his hands in the pie, for the operation contained more Marines than soldiers, and depended on the Marines more heavily than the air cavalry, for whom Operation Pegasus was named.<sup>331</sup> Cushman and Westmoreland immediately agreed that opening Route 9 should be the priority for this new unit so that Khe Sanh was no longer dependent on air logistics, and Westmoreland set a target date of April 1st for the operation to begin.<sup>331</sup> To call Pegasus a relief operation, then, is incorrect, because planning was not even completed and the operation was not scheduled to start until after Westmoreland and his staff had decided that the battle had been won.

Westmoreland made two other key decisions on 10 March. He decided to overrule the objections of the Marines and implement Momyer's plan for the centralization of air control by designating the 7th Air Force as the single management authority for air operations.<sup>332</sup> It will be shown that this decision had little effect on the battle because it was not fully implemented for several more weeks (by which time the NVA effort had declined even further), because the Marines figured out ways to circumvent direct Air Force control, and because the system that was implemented contained key compromises. The other decisive action Westmoreland took that day

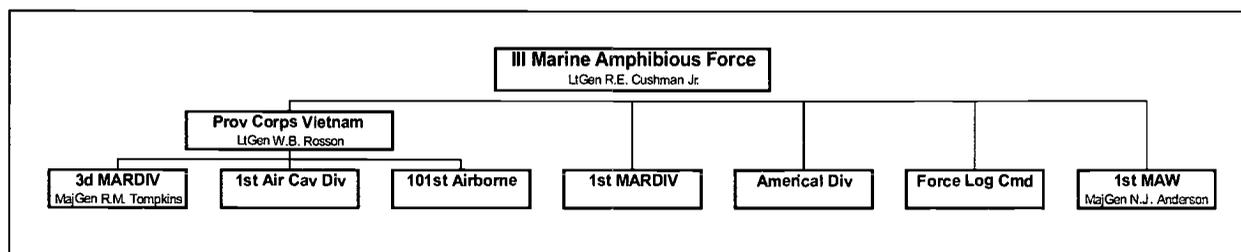


Figure 5. Command relationships between major units and headquarters of the I Corps Tactical Zone during (and after) Operation Pegasus

was to request 206,000 more troops from President Johnson to win the war. Putting this request in the context of the other decisions indicates even more clearly MACV's viewpoint that victory at Khe Sanh had allowed him to "turn a corner" in the war. Unfortunately for Westmoreland, the request was perceived somewhat differently by President Johnson, who eight days later finally announced that Westmoreland would finally be coming home to the United States.<sup>333</sup>

Operation Pegasus was initiated on 1 April, as Westmoreland had directed. The westward attack to reopen Route 9 and clear the NVA from the region around Khe Sanh began from forward bases set up near Camp Carroll, the Rockpile, and Ca Lu, where the 1st Air Cavalry could rapidly spring westward in heliborne assaults. For six days before the attack began, one squadron of the Air Cavalry roamed up and down Route 9 by air, looking for any signs of NVA activity that could be located and hit with artillery, tactical aircraft, or one of the 10 B-52 strikes that had been set aside for daily support.<sup>334</sup> On 1 April, the main ground force, the 1st Marine Regiment, advanced westward along Route 9, supported by elements of the 1st ARVN Division. The 2d Squadron of the 7th Air Cavalry Regiment (2/7 Cav) conducted supporting heliborne attacks into numerous landing zones paralleling the Marines' westward advance in what was the largest combined U.S.-South Vietnamese offensive of the northern provinces during the entire war.<sup>335</sup> From the start, poor weather restricted the effectiveness of tactical aviation,

since on most days the weather did not even improve to the basic helicopter flight requirements of 500-foot ceilings and 1-1/2 miles visibility until the afternoon.<sup>336</sup> Fortunately, enemy resistance was light, since only the 304th Division remained in the area, covering the withdrawal of the other NVA units. The NVA force now consisted of approximately 12 battalions, but they either could not, or chose not to coordinate anything larger than company-sized operations.<sup>337</sup> As the 2/7 Cav approached Khe Sanh, it used its air mobility to spearhead the final attack, reaching the perimeter on 7 April, but by then the enemy was essentially gone. If there had been a siege, it had been long over. As Captain Dick Camp, a Khe Sanh veteran who had the added perspective of serving as the division commander's aide during Pegasus, put it, "the Army's 1st Cavalry Division claims it broke the siege by throwing numerous aggressive airmobile assaults into the hills overlooking the combat base. In reality, the enemy broke the siege by leaving."<sup>338</sup>

The NVA departure was expedited by the activity of the 26th Marines, which had technically also been transferred into Operation Pegasus by the operation order. The Marines were anxious most of all to seize the initiative and settle some scores. They also wanted to avoid the appearance that they would be rescued by the Army, a misconception that is reinforced even today not only by Army veterans, but also by Marines who insist on calling the NVA effort at Khe Sanh a siege. General Cushman ordered the Marines

to take the offense, later explaining, "The situation warranted it, in that the enemy was defeated and had begun to pull out. I therefore wanted no implication of a rescue force or breaking of the siege by outside forces."<sup>339</sup>

On 4 April, three days before the arrival of the 2/7 Air Cav, 1/9 attacked southward to seize Hill 471, which turned out to hold one of the last pockets of enemy resistance. The attack was halted until after an air and artillery bombardment softened the defenses. G/2/26 attacked toward Hill 558 on 6 and 7 April, and met similar results. The artillery and air preparation took two full days to achieve the desired effects due the limited availability of aircraft and constant check fires for helicopters interfering with artillery missions. Both of these problems were likely the result of the final approach of the 2/7 Air Cav, whose high density air operations must have wrought havoc with the already saturated airspace and fire support coordination system at Khe Sanh. After two days of air and artillery preparation, the Marines' outward attack was resumed on 10 April. The NVA that remained rapidly withdrew.<sup>340</sup>

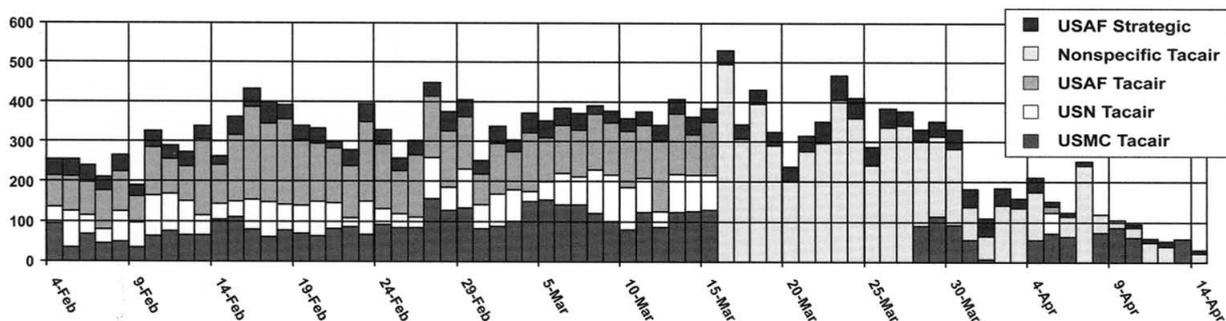
As the "relief" forces of Operation Pegasus advanced westward and reached Khe Sanh with little resistance, General Rosson apparently decided that there was little reason to waste any more time there. Even though Route 9 was not to be successfully opened until 12 April, air sup-

port was rapidly reduced, as shown in Figure 6. Only 45 Arc Light strikes and a total of 1,625 tactical aircraft sorties were devoted to support the operation because Rosson saw additional effort as a waste and wanted to open a new offensive to seek out any NVA that might be hiding in the A Shau valley to the south.<sup>341</sup> General Cushman supported this idea, wanting to keep the enemy off balance,<sup>342</sup> and Westmoreland was won over on 10 April. As a result, when Operation Pegasus came to an end on 15 April, the 26th Marines were continuing to find pockets of NVA in the region around Khe Sanh, and control of the region was never entirely regained from the enemy.<sup>343</sup>

### Khe Sanh After Operation Pegasus

When Operation Pegasus ended, the final tally was 1,304 NVA killed at the expense of 125 U.S. and ARVN killed, 853 wounded, and 5 missing.<sup>344</sup> With such numbers Westmoreland could claim that his victory had been complete, but the question remained about what activity the U.S. would pursue in the region. Westmoreland clearly saw opportunities to use the base for future operations against the NVA sanctuary in Laos, as he had originally planned long before the siege ever began. President Johnson's 23 March announcement that Westmoreland's time as COMUSMACV would soon be over, however, doomed this vision, as his subordinates began to take more active roles in planning. General Cushman, for example, saw

Figure 6. Daily attack sorties devoted to operations around Khe Sanh, by service and type.



this as an opportunity to withdraw his Marines from the vulnerable outpost, the same course of action he had argued for before the battle ever took place. At Cushman's urging, Ca Lu became the main base of operations in northwest Quang Tri province, which was more suitable because it was out of range of the NVA artillery in Laos, was closer to the coast bases, and was not subject to the horrible crachin weather which had limited air support so much at Khe Sanh. Although Khe Sanh was no longer the main outpost, however, Westmoreland refused to completely close the combat base while he was in charge of MACV.<sup>345</sup> Among other things, Westmoreland did not want the American citizens wondering exactly why so many lives had been lost to hold Khe Sanh, only to surrender the outpost at the end of the battle anyway. As a result, approximately 1,000 Marines continued to operate out of Khe Sanh as their main base of operations in the highland region for the next several months, until Westmoreland finally turned over command of MACV to his deputy, General Creighton Abrams, on 11 June. The very next day, Abrams ordered the combat base to be abandoned and destroyed to prevent its use by the enemy. His motivation may have been his desire to switch to a more mobile defense of the region that retained the initiative, a move that was now possible because of the increased numbers of army troops in the ICTZ to assist the Marines. He may also, however, been influenced by a March visit to Washington, D.C.<sup>346</sup> Coincident with Westmoreland's exasperating request to President Johnson for more troops, and Johnson's negotiations with the North Vietnamese at Paris, the visit must have made it clear that an expansion of the war into Laos was very unlikely.<sup>347</sup>

In the meantime, the task of finding and attacking the NVA left in the region by the early conclusion of Operation Pegasus fell to the Marines. Even in the final days of Pegasus, they were engaging in some hard-fought battles, but the waning COMUSMACV interest in the region

was causing some problems. As Figure 6 shows, Westmoreland's conclusion that the enemy had been beaten at Khe Sanh meant that the Marines suffered from a considerable decrease in air support. 7th Air Force, the new centralized air management agency, was looking for other decisive points to concentrate air power, and the Marines would now have to depend solely on the support of the 1st Marine Air Wing. The attack they launched on Hill 881N on April 14th was a test of the Marine air-ground team under the new limitations of the new single management plan.

Hill 881 North had been an enemy stronghold for a long time. It was the place where the Marines met the fiercest resistance during the Hill Fights on 1967, it was the place where the Marines of I/3/26 were engaged in a bitter battle on 20 January 1968, only to be recalled to 881S as the siege began, and it was the place from which the NVA had launched so many rockets and assaults on the other outposts over the course of the siege. On 10 April, the rest of 3/26 moved to Hill 881S to reinforce India Company, which had held the hill for the duration of the siege. The battalion began patrolling, and discovered a huge network of abandoned NVA trenches that came as close as 300 meters to the Marine perimeter.<sup>348</sup> Khe Sanh could never be secured until 881N had been cleared of the enemy, so the Marines

*A convoy heading to Khe Sanh after Route 9 was finally opened on 12 April. The road had been closed for more than eight months.*



of 3/26 set out with the goal of killing as many NVA as they could to discourage any continued presence. Expecting that the enemy would seek close engagements to deny the Americans the standoff needed to employ their heavy firepower, the battalion planned for the Marines to avoid entangling engagements, and withdraw once contact was established so that air and artillery could be brought to bear.<sup>349</sup>

As another test of the Marine air-ground team under the limitations of single air management, the attack was a great success. After two hours of air and artillery preparation, enemy resistance was relatively weak, and as the Marines attacked, the NVA abandoned their primary fighting positions. An NVA force estimated to be a company-sized element attempted to make a stand at its secondary defensive positions, but it was again hit by a combination of air support, artillery, and recoilless rifle fire. The enemy retreated, but was subjected to a pursuit by fire, under constant harassment of artillery and air attacks that prevented any possibility of counterattack. Ultimately the Marines recorded 106 NVA dead at a cost of 6 Marines killed and 32 wounded. The following day, Pegasus was officially terminated and the 26th Marines was replaced at Khe Sanh by the 1st Marines. 3/26 abandoned Hill 881N, having accomplished its mission of driving the enemy from that area.<sup>350</sup>

With the official end of Operation Pegasus on 15 April, the Marines still had plenty of work to do. To begin with, the NVA had withdrawn from contact, but maintained some interest in Khe Sanh. That very day, for example, the base was bombarded by 306 NVA rounds.<sup>351</sup> The 1st Marines, who had marched westward to open Route 9 before taking responsibility for KSCB, now held operational control of six infantry battalions, two of which were veterans of the recent siege (1/9 and 2/26). The operation was named Scotland II, emphasizing that the goal was merely to con-

tinue the destruction of NVA around Khe Sanh, which had brought the 26th Marines to Khe Sanh in the first place under Operation Scotland. In the sequel offensive, the Marines mopped up enemy forces with mobile and flexible forces using a maximum of artillery, air, and other supporting fires.<sup>352</sup>

In this effort, Khe Sanh ceased to serve as a true combat base. On 5 May, the logistic pipeline which ended at Khe Sanh was closed down. As a result, all support came from Ca Lu either by helicopter delivery directly to the supported unit, or overland along Route 9. The NVA force quickly recognized this vulnerability and began to increase its activity along the tortuous overland road, with company-sized ambushes and larger attacks beginning 14 May. Many of these were broken only with the heavy mobile fire support of Marine CAS.<sup>353</sup>

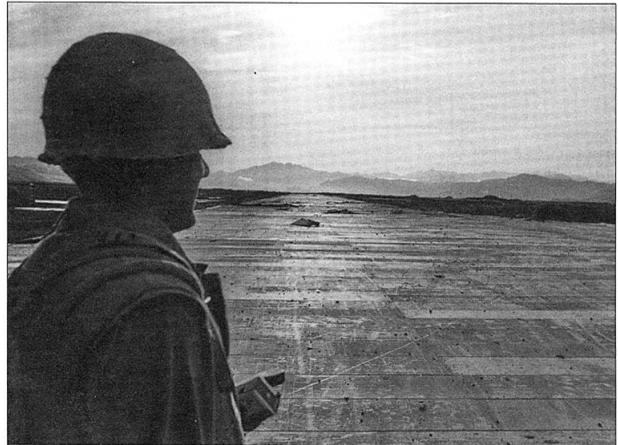
At the end of May, III MAF intelligence confirmed what was becoming apparent to the Marines around Khe Sanh: two regiments of the fresh 308th Division had infiltrated into the region to fill the vacuum created by departing American units. The NVA leaders were so interested in large-scale operations that they even ordered a new road built, entering Quang Tri province from Laos. Fifteen kilometers south of Route 9, it ran a parallel track from the west to allow the NVA to feed forces into the region, even as the Marines advanced from the east.<sup>354</sup> Under Scotland II, the Marines were having a hard time keeping the enemy at bay, but close air support was an important part of what success they enjoyed.

The 4th Marines arrived to join the 1st Marines in Operation Robin, countering the enemy buildup in a drive to clear the NVA from the jungles south of Khe Sanh. Air support remained an important part of this strategy. When Robin was initiated on 2 June, it had been preceded by 219 tactical air sorties and 30 B-52 sorties targeted on

the NVA control nodes, dumps, and troop concentrations. Air support was also critical in stopping at least one battalion counterattack.<sup>355</sup>

The end came rapidly once Westmoreland was finally relieved as COMUSMACV to assume duties in Washington as the Chief of Staff, U.S. Army on 11 June. The next day, III MAF headquarters published a new concept of operations which included Abrams' and Cushman's plan for abandoning Khe Sanh in favor of mobile operations.<sup>356</sup> One week after assuming command of MACV, General Abrams ordered Operation Charlie to finally evacuate and destroy the combat base.<sup>357</sup> Ideally, the Americans sought to depart without revealing their intent to the NVA, and without leaving the American people wondering why they had fought such a bitter battle to hold a combat base which was abandoned a short while later. Once planning began, however, the word soon got out, and the press, already hypersensitive about any issue relating to Khe Sanh, was quick to publish the information. The story broke in the *Baltimore Sun* on 1 July. Fortunately for the Marines, as I/3/4 began dismantling the combat base, artillery and tactical jets were able to prevent the NVA from succeeding in an attempt to block the withdrawal. The last Marine unit withdrew from Khe Sanh by helicopter on 11 July.<sup>358</sup>

The operations conducted around Khe Sanh from 1 April to 11 July 1968 are important not only because they reveal much about the thinking of top leaders on both sides of the battle, but also because they demonstrated the continued value of close air support. In the dynamic situation of maneuvering ground forces, the Marines were supported primarily by Marine aviators, and there were no failed attacks due to air support. Even when the 7th Air Force substantially reduced its commitment and held unprecedented control over Marine aircraft as a result of the single management decision, the Marine air-ground team continued to operate under its



*A Marine of the 3d Battalion, 4th Marines looks out at the empty runway after the combat base was dismantled. Since there was no longer a need to make repairs to the runway surface at the deserted base, the effects of NVA bombardment can still be seen.*

doctrine of close cooperation, and continued to enjoy excellent results.

### Control of Air Support Operations at Khe Sanh

Before taking a more detailed look at the contributions the various services made to the battle of Khe Sanh, it is important to understand the means by which air support was targeted at the enemy, and controlled in its attacks. The two institutional approaches to air warfare each produced different command and control arrangements, and created an enormous amount of interservice conflict, which reached its culminating point even as the 1968 battle of Khe Sanh was being fought. Because this conflict revolved around the 7th Air Force's attempt to unify both Air Force and Marine fixed-wing aviation assets in Vietnam under one command and control system, it became known as the single management controversy.

### The Single Management Controversy

For all operations in the ICTZ in 1967, the primary air control system was the Marine Air Com-

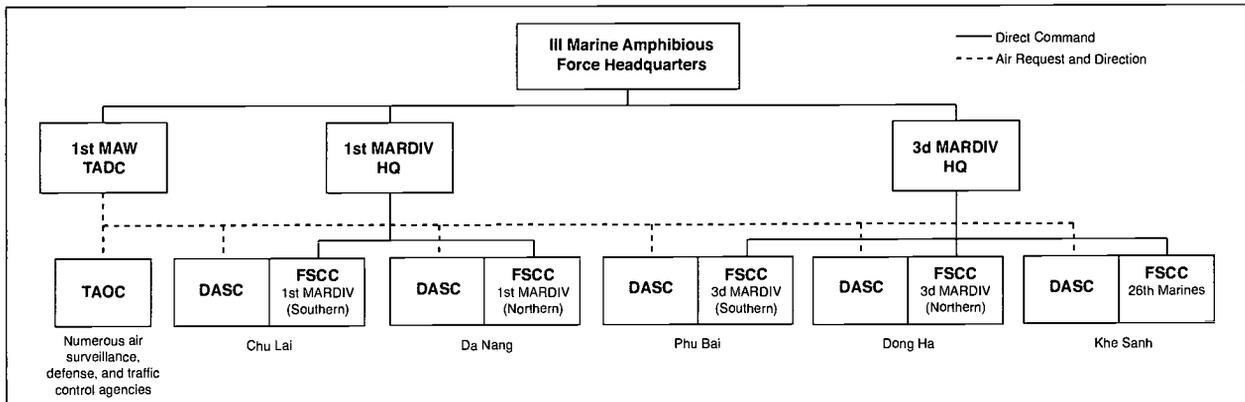
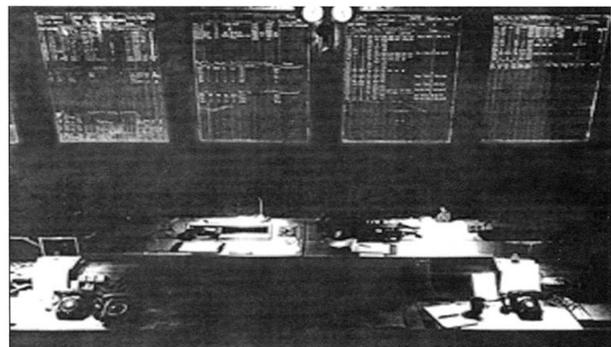


Figure 7. Interface between the Marine Air Command and Control System agencies of the 1st Marine Air Wing and its supported units (1st and 3d Marine Divisions).

mand and Control System (MACCS) provided by the 1st MAW. The highest echelon of this system was the Tactical Air Direction Center (TADC), located at the Wing Headquarters in Da Nang. This organization was responsible for forming and writing the plans for future operations, as well as the production of the daily air tasking order (ATO) and supervision of its execution. In charge of various command and control detachments to provide air defense, radar surveillance, and air traffic control was the Tactical Air Operations Center (TAOC). Of more direct relevance to the support of ground forces were the five Direct Air Support Centers (DASCs) of 1st MAW. These organizations served as the primary links between the ground units and the aircraft which supported them. Generally, they were collocated with the Fire Support Coordination Centers (FSCCs), the ground units' nerve centers for artillery, mortar, and air support. The DASCs processed requests for air support from the various ground units, and passed them up the MACCS system, ensuring that they were prioritized by the FSCCs. When these requests finally reached the TADC, they were "fragg"ed to the various supporting aircraft units. This was first done informally in a warning order, called a "frag" order because it was based on partial, or fragmentary, information. The frag order was disseminated the night before the mission was to be flown, to give the various squad-

rons time to anticipate their tasking for the next day. Overnight, the "frag" was formalized in an Air Tasking Order (ATO), which would include all of the details of the mission, including call signs, numbers and types of aircraft, on-station times, ordnance to be carried, and ground unit to be supported. The ATO was published daily, taking effect each morning, and incorporating requests for air support made just 11 hours earlier. More immediate requests for support were serviced by sorties kept in reserve for that purpose, known as alerts. Unlike the Air Force system, which

*The interior of a Marine Direct Air Support Center in Vietnam. Each board on the wall was used to track the sorties devoted to a particular mission area. The mission numbers, call signs, aircraft types, and mission times were noted with grease pen to allow the seated controllers to monitor and direct each mission. The fixed-wing CAS flights were recorded on the two boards to the right.*

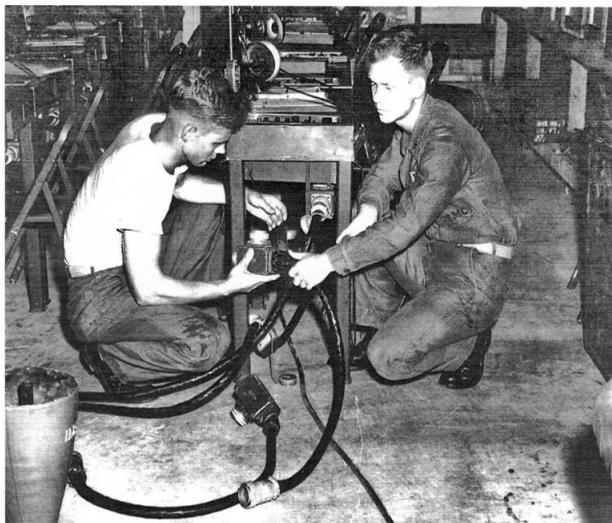


managed only fixed-wing flights, the Marine ATO included all Marine fixed-wing and rotary-wing flights for each day.

Once the TADC published the ATO, each squadron was responsible for making sure its aircraft got airborne with the specified ordnance on time. After departing the airfield and being routed to his tactical operating area by the air traffic control units of the TAOC, the mission commander established radio contact with the DASC of the unit he was tasked to support. The DASC then provided both updated mission information, and deconflicted the flight path of that aircraft from the other aircraft, artillery fires, and mortar missions in that area. Finally, the DASC put the aircraft in contact with a forward air controller, either on the ground or in an observation aircraft, who assisted the attacking aircraft with delivering its ordnance at the time and place most critical to the supported ground unit's operations.

All the airspace above III MAF's ground area of operations was controlled by a DASC, facilitating

*Two Marines maintain the communications cables at a DASC work station. As the primary interface between the Marine Corps' air and ground forces, the DASC required an extensive communications capability.*



the delivery of air support anywhere within the ICTZ. In southern I Corps, there was a DASC collocated with both the 1st MAW headquarters and 1st Marine Division Headquarters at Da Nang. The southern half of the 1st MARDIV's area of operations was controlled by another DASC at Chu Lai. For the general support of the 3rd Marine Division there were two additional DASCs: one at the division headquarters in Phu Bai, and a second at the division's forward headquarters at Dong Ha.<sup>359</sup> In order to meet the increased demands of the growing battle at Khe Sanh, on 23 January, a third DASC was established at the Khe Sanh Combat Base, collocated with the 26th Marines FSCC.<sup>360</sup>

The existence of a separate Marine air command and control system within the ICTZ had been a point of dissatisfaction within the Air Force in Vietnam for some time before Khe Sanh. The 7th Air Force was the primary subordinate command responsible for MACV's air operations. Since the commanding general of this organization was charged with the supervision of all MACV air operations, it is easy to understand that Air Force leaders did not appreciate the fact that III MAF was essentially operating its own air force to fight its own distinct war in the ICTZ. This was considered in contradiction to the principle that an air commander should have the ability to mass his forces at the decisive time and place on the battlefield, just like a ground commander. The Air Force, therefore, saw the arrangement as inefficient at best, but the Marines saw no such contradiction because they enjoyed unity of command throughout the ICTZ and believed air power was always subordinate to ground warfare.

The Marine Corps defended the existence of a separate air force in ICTZ through its doctrinal establishment as a combined arms team, with a ground combat element dependent on an integral air combat element. A comparison of the Army and Marine structures in Vietnam (Table

1) reveals much behind this argument. In short, the Marine Corps, with approximately one-third more men per infantry battalion, 20 percent less artillery support, and 75 percent less integral helicopter support, needed 50 percent more fixed-wing air support.<sup>361</sup> By Marine Corps doctrine, there should have been one Marine Air Wing deployed to Vietnam to support each Marine Division. With just one reinforced Marine Air Wing actually there they were getting by, but they were not about to voluntarily surrender control of their assets to a joint air management system.

The Marines were anxious to preserve the integrity of their air-ground team not only because their doctrine called for it, but also because they had a right to benefit from an air wing that was squeezing more support from the aircraft it had. The Marine divisions were getting more support out of fewer aircraft because the 1st MAW flew each aircraft two times per day, while the 7th Air Force sortie rate was maintained at only 1.1, saving aircraft readiness for surge operations at the commanding general's discretion.<sup>362</sup> In effect, the Marines were getting 50 percent more air support with only half the aircraft. It would seem that if the Air Force argument for single management was based on efficiency, the Marine Corps had a lot more to offer under its own system. To the Marines, designation of Operation Niagara as a critical joint air effort should have elicited an increased sortie rate out of the 7th Air Force, rather than a renewed effort to impose a less efficient joint air management system.

Unfortunately, General William "Spike" Momyer, the Commanding General of the 7th Air Force, focused on the latter course of action. Momyer had assumed command of the 7th Air Force in July 1966, and there are indications that one of the reasons he was appointed to the job was because he had a tenacious and abrasive personality which could win interservice disputes in Vietnam.<sup>363</sup> To Momyer, MACV's identification

of Khe Sanh as an opportunity to annihilate the NVA with air power also represented an opportunity to put new urgency behind the Air Force push for single management. Before Niagara began, Momyer declared to an Air Forces Pacific survey team, "If the battle of Khe Sanh develops, it may be the event to get the air responsibilities straightened out like we had them in Korea and World War II."<sup>364</sup> As soon as planning for the campaign began, he renewed his demands for adopting the unified system. His initial attempts succeeded in convincing Westmoreland that the step was necessary for the proper execution of Operation Niagara, but Westmoreland would not make such a politically contentious step without the approval of his own boss, CINCPAC, Admiral U.S. Grant Sharp. Westmoreland submitted a letter of intent to adopt to the new system to Sharp just a week before Niagara was to begin. Influenced by Marine Lieutenant General Victor "Brute" Krulak, the Commanding General of Fleet Marine Forces Pacific who had been kept well informed of the debate by Generals Cushman and Anderson, Admiral Sharp immediately put a halt to Momyer's scheme. In the two months it took to resurrect the plan, the Marines and Air Force found a way to reconcile their differences enough to begin the application of air power in Operation NIAGARA. As an interim solution, they implemented a more detailed version of the geographic separation that had already existed in the ICTZ, as is detailed later in this chapter.

When single management was imposed, some of the Marines' fears were realized. In his debrief on the battle, Colonel Lownds said,

The time of request for an on-call mission just about doubled. We got an echelon of command imposed between us. We had to increase our hours from 12 to 16 hours and also pull guys off radios and let guys double up on radios just to take care of the paperwork involved.... If you wanted a pre-planned strike

you could have it the next night following the night you put it in as a TPQ strike—in other words, 48 hours afterwards.... Air should be more responsive than 48 hours! At Khe Sanh the enemy didn't stand still and wait for you to hit him.<sup>365</sup>

Lownds also felt that single management was the primary causal factor for what turned out to be a near-catastrophe. On 5 April, as the Marine units began to advance out of their perimeter, radar controlled aircraft were directed to drop ordnance on a hill that had recently been occupied by 1/9. Lownds explained that the target had been submitted 48 hours prior to the attack, but when 1/9 moved onto the hill the next day, the target request was cancelled. Unfortunately, the cancellation was dropped by one of the many echelons that now had to process it, and the attack was allowed to continue. Miraculously, not one of the 24 bombs dropped on the Marines was properly armed, so they escaped harm for the most part.<sup>366</sup> Lownds, the commander of the supported unit in this campaign, was clearly unimpressed with single management. He had to devote greater effort to a system that was considerably less responsive than the old one, and with it came the potential for disasters he had not had to worry about before.



*General William W. "Spike" Momyer, U.S. Air Force (pictured here as a lieutenant general in 1964), was the commander of the 7th Air Force and General Westmoreland's deputy commander for air operations. Momyer had long advocated centralized control of air forces, and was an opponent of the Marine Corps' independent operational control of its own air assets. Momyer saw Operation Niagara as an opportunity to finally achieve his plan.*

*Table 1. Comparative strengths of U.S. Marine and Army infantry divisions in Vietnam, and the air support they could expect to receive based on assigned air assets, from Shulimson, The Defining Year, 508.*

	Army Division	Marine Division
<b>Authorized Strength</b>	17,116 men	20,736 men
<b>Transport Helicopters</b>	479	138**
<b>Observation/Attack Helicopters</b>	184	30**
<b>Fixed-Wing Aircraft</b>	132*	80**
<b>Sorties of fixed-wing air support per battalion per day</b>	4	6

*\*Equivalent number of aircraft that would be maintained for the support of each Army division by the 7th Air Force at a 1.1 daily sortie rate to meet their joint service agreement.*

*\*\*Half the aircraft maintained by the 1st MAF to support the two Marine Divisions in Vietnam. These aircraft were able to generate more sorties per battalion than the Air Force because they were flown at a 2.0 daily sortie rate.*



*Admiral U.S. Grant Sharp Jr. served as CINCPAC from 1964 through the battle for Khe Sanh. General Westmoreland answered to Admiral Sharp, who was in command of all U.S. forces in the Pacific theater, so Westmoreland could not implement Momyer's plan for single management without Sharp's concurrence. Sharp had resisted such centralized plans that would have detached Marine air forces from the operational control of III MAF since the Marines first arrived in Vietnam and delayed the imposition of single management several months. This forced the Air Force and Marine Corps to find another way to cooperate against the enemy at Khe Sanh.*

Fortunately, the negative impact of single management on the support of Marines at Khe Sanh was mitigated by several factors. First, although single management was officially adopted on March 10th, the new system was not implemented until 31 March, just 15 days before Operation Niagara and the siege of Khe Sanh gave way to Operation Pegasus and the evacuation effort. Next, since III MAF and the 1st Marine Air Wing owned the bulk of the forces occupying the airfields in the ICTZ, they were the air support providers closest to Khe Sanh. Geographically, this made Marine squadrons the most efficient units

for the 7th Air Force to task with close air support missions near Khe Sanh. Finally, even when the watered-down version of single management went into effect, the 1st MAW and individual Marine aviators found ways to circumvent the system to provide the Marines at Khe Sanh with the support they needed. On an institutional level, 1st MAW frequently diverted aircraft or added new missions that were never listed on the 7th Air Force ATO. This was in addition to the 12 attack aircraft kept in an alert status 24 hours a day, ready to take off within 10 minutes of being called, so they could immediately fill any needs not being met by aircraft that were currently airborne.<sup>367</sup> Once airborne, some Marine aviators also took it upon themselves to ignore the new air control procedures. Rather than working through a more convoluted system that might or might not ultimately put them in contact with Marines in need of support, these aviators simply checked in with the Marine air controllers at Khe Sanh who they knew needed their support. By devoting assets to an air support reserve and instituting other "work-arounds," the Marines retained some of the flexibility of the MACCS to make up for the Air Force system's inability to incorporate ground requests made less than the 50 hours before the ATO was published.

In summary, the single management controversy and its effect on the battle of Khe Sanh is often overstated. Although the single management of aviation assets within Vietnam was the subject of heated debate which resulted in a fundamental change of air command and control during the battle for Khe Sanh, Operation Niagara largely became an excuse to put a new twist in an ongoing interservice dispute, and the adoption of single management had a limited effect on the Marines at Khe Sanh. This was largely true due to Marine efforts to preserve the air-ground team by countering the imposition of the system and mitigating its effects, something they would not be so successful at later in the war. A study of air

support at Khe Sanh, however, should focus on a more detailed analysis of the two systems that coexisted during most of the siege.

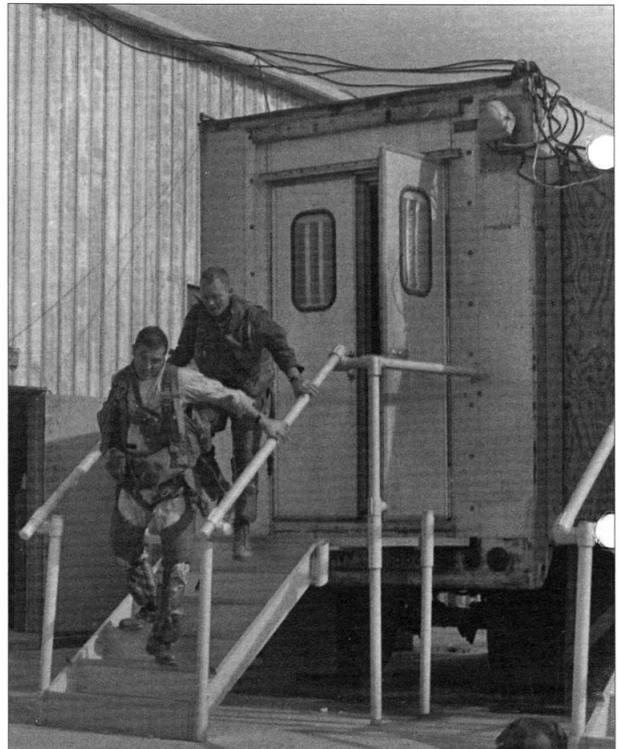
### Management of Air Assets Under Dual Command and Control Systems

For the vast majority of the battle of Khe Sanh, the Marines were not subject even to the diluted version of single management, but rather to the pre-existing system. Two distinct air command and control systems had been in effect in the ICTZ for some time. This condition had been considered tolerable, if not ideal by the Air Force, for several reasons. To begin with, the systems provided control for aircraft coming from two command structures, serving as conduits to successfully get both types of aircraft to the same battle area. Once in the area, conflicts were minimized to a large degree because the two different DASCs (the USAF DASC-Victor and USMC DASC-Horn) each supported different ground units which usually operated in distinct subdivisions of the ICTZ.<sup>368</sup> As long as there were Army units within the ICTZ, therefore, DASC-Victor provided interface and control of aircraft (usually Air Force) supporting those units in their specific operating areas, while DASC-Horn provided the same functions for the Marine divisions. Another move that helped minimize conflict was that each of the services assigned a full colonel, an officer with maturity and perspective of the larger battle, to supervise the activities of its DASC on an equal footing with the partner/competitor agency.<sup>369</sup> Over time, as additional units were moved into the ICTZ, the complexity of the MACCS increased, as illustrated in Figure 7. By January 1968, there were two subordinate DASCs supporting the 1st Marine Division in the southern part of the ICTZ, with two other DASCs supporting the 3d Marine Division in the North. Even with four Marine DASCs, as long as the different divisions continued to occupy different areas of operation, as was natural for units of that size, the overlapping coverage of the two air

command and control systems was minimized, as was the potential for conflicts. In effect, the systems remained geographically separated within the ICTZ, which facilitated functional separation. Operation Niagara changed all of this.

The problem with Niagara was that it sought a decisive concentration of air power from all of the services in the relatively small airspace around Khe Sanh. If each of the services was attempting to provide support for the same battle, it seemed that there would have to be a central

*The crew of an F-4B Phantom of Marine Fighter Attack Squadron-115 scramble to get airborne. Each of the three Marine fixed-wing air groups in Vietnam constantly kept four aircraft in an alert posture on the group's "hot pad." With the aircraft readied for takeoff and the crew dressed and waiting nearby in an air-conditioned trailer, a section of two aircraft could get airborne in 10 minutes to answer any immediate needs for close air support. Once the first two aircraft launched, the next two would increase their readiness to assume the 10-minute alert.*



air control authority for two reasons. First, support would have to be deconflicted to ensure that there was not a redundant application of air power. Of more immediate concern, a single system could prevent two aircraft from attempting to occupy the same airspace at the same time, causing a collision. These concerns were exactly what brought such immediacy to the single management argument that General Momyer had been advocating for months. In the meantime, however, airspace conflicts on the first day of the battle made it clear that an interim arrangement would have to be reached, so 7th Air Force representatives met with the Marines in Da Nang on 22 January and developed a compromise solution.<sup>370</sup> The result was a miniature version of the geographical deconfliction that had served the ICTZ so well up to that time. In effect, the airspace around Khe Sanh was divided into a series of zones, each controlled by a different DASC responsible for coordinating the attack of targets identified within its zone.

The ground and airspace around Khe Sanh was divided into several different regions, as illustrated in Figure 8. The three zones closest to Khe Sanh (indicated by areas A and B on the figure) included the immediate battle space around the combat base and its outposts. These were the areas where the fire support integral to those defenses, including mortars and 105mm howitzers, could be used to influence the close battle and defeat attacks by the NVA. This was also the area where all of the Marines were deployed in outlying defensive positions, or were likely to be deployed in patrols at one time or another. As such, the 26th Marines were quite properly unwilling to turn over control of this airspace to another agency. To do so would have meant that the Marines would not have had final clearance authority on any air drops or artillery missions fired in close proximity to their own troops. It would also have meant that they would have had to seek permission from another agency before

they could fire emergency missions essential for the defense of their own perimeters. By owning the air and ground space in areas A and B, the 26th Marines could exercise unrestricted control of all maneuver units fighting in this area, as well as all air strikes and indirect fire missions executed in support of those units. The agency responsible for this coordination was the 26th Marines Fire Support Coordination Center. The FSCC exercised control of aircraft in that zone through a fifth DASC added to the ICTZ, which was collocated at Khe Sanh Combat Base. The FSCC could also request the support of long-range Army 175mm artillery batteries stationed further east at the Rockpile, as well as Air Force, Navy, and VNAF sorties, but any additional support provided within areas A and B, came strictly under the control of the 26th Marines.

Immediately to the east was another zone (region C in the figure), left under the control of the 26th Marines' higher headquarters, the 3d Marine Division. The 26th Marines did not require control of this zone because there was a decreased likelihood of NVA forces operating in this area, and the Marines had no outposts in this area. Leaving this zone to higher headquarters meant that the 3d Marine Division could conduct ground operations, artillery missions, and air attacks there without bothering the FSCC at Khe Sanh, which was already task-saturated and had little interest in this area. The 3d Marine Division exercised fire support coordination over this region, like the rest of northern ICTZ, through its own FSCC at the division headquarters in Dong Ha. Air control was provided by DASC-Bravo, also at Dong Ha.<sup>371</sup>

The final divisions of airspace around Khe Sanh were controlled by the Air Force, indicated by regions D and E on the figure. This control also extended to the airspace over Laos. This region lay beyond the reach of most artillery in the ICTZ, and only very rarely contained friendly forces, in the form of small reconnaissance pa-

trols. Since this region was beyond the reach of Marine supporting arms and there was no danger of inadvertently attacking Marine maneuver units, it was divided into a set of free fire zones, and relinquished to the Air Force to fight its deep battle of attrition at its own discretion, and without the need for coordinating or deconflicting with the 26th Marines. Air missions were coordinated by an Airborne Battlefield Command and Control Center (ABCCC, or "A-B-Triple-C"). This was a C-130 configured with a command and communications suite which would orbit over Laos, and essentially functioned as an airborne DASC. ABCCC was in contact with the 7th Air Force headquarters near Saigon, and also with a small detachment of Air Force personnel on the ground in Khe Sanh. During periods when the ABCCC retired, control of missions in the Air Force zones was relinquished to the USAF's DASC-Victor, so that there was always some extension of the Air Force command and control system to supervise its zones, 24 hours a day.

Even though there was a geographic separation of air control responsibilities in the airspace around Khe Sanh, the services were attempting to win the same battle, and they shared information and assets. The 7th Air Force operations center was the central collection point for target information in the region, and targeted most of the strikes in the outer zones, but the 26th Marines FSCC often submitted requests for air strikes on targets it identified in the Air Force's free-fire zones, which were then controlled by ABCCC. If the 26th Marines obtained information on imminent threats to the combat base or its outposts which proved beyond the immediate capabilities of Marine aircraft, they could also request the diversion of 7th Air Force sorties from less important targets in the Air Force zone. If any particular zone lacked a concentration of worthy targets and had extra sorties available, the control agency could contact the controller of an adjacent zone, and send the extra aircraft to that

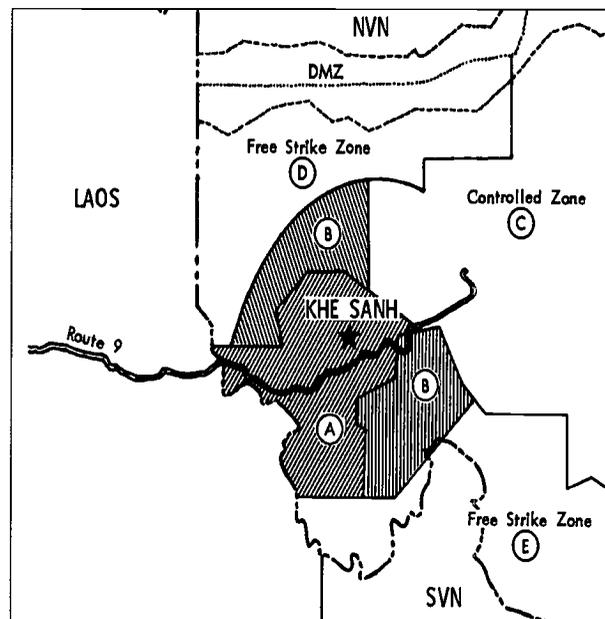


Figure 8. Airspace divisions in the vicinity of Khe Sanh for Operation Niagara, January 1968. Illustration from Bernard Nalty, *Air Power and The Fight For Khe Sanh* (Washington, 1973), 75.

region to be directed against more promising targets. As a result, Air Force aircraft frequently found themselves attacking targets in the Marine zones under Marine control, and Marine aircraft often found themselves directed to work in the outer free-fire zones by ABCCC. Navy aircraft were technically under the domain of the 7th Air Force, but found themselves working for either control agency.

Despite their success at circumventing interservice disputes, there were also problems with these command and control arrangements, and with the geographic division of responsibilities. The 26th Marines, for example, complained that feedback on the conduct of missions controlled by ABCCC was nonexistent, making it difficult for the defenders of Khe Sanh to figure out if threats they identified had been destroyed, which was vital for an accurate picture of enemy capabilities and intentions.<sup>372</sup> The FSCC bunker at Khe Sanh was also too small to allow the Marine

DASC detachment to be truly co-located. With the control of aircraft around Khe Sanh placed in the hands of air wing Marines located in a bunker 75 meters away, communication often broke down when KSCB came under heavy attack, since telephone wires were sometimes broken and messengers could not travel back and forth under heavy bombardment. Unfortunately, this was just the time when the DASC needed an accurate battle picture the most. Fortunately, space was made for the Marine DASC in an Air Force bunker. There the DASC Marines benefited from a host of special amenities rarely seen by other Marines at Khe Sanh, but they fostered a better common air picture for the two services in their attack and support operations.<sup>373</sup> This controller-level interservice communication and understanding was especially critical because the Air Force rotated the majority of its personnel out of Khe Sanh after one week of duty at the combat base.<sup>374</sup> The experience of the Marines who were there for the duration of the siege provided continuity which increased the situational awareness of the Air Force controllers.

### Targeting of Air Support Assets at Khe Sanh

Targeting is the process by which the enemy is detected, located, identified, and prioritized for attack. The NVA hit by air strikes around Khe Sanh were subjected to the same targeting process that was used for all of the other supporting arms, centralized in the 26th Marines FSCC. Once targets were located, the FSCC decided which of the supporting arms was best suited to attack each target. For example, an extensive enemy position which had to be destroyed composed a better target for a B-52 raid than a mortar attack, but a hilltop about to be assaulted by a company of Marines required more discriminating weapons. When all other factors were equal, often geographic considerations dictated which supporting arms would be used. The NVA delib-

erately placed most of their artillery just beyond the range of the Marine artillery, which meant that only air power could be targeted against them. The heavy 175mm Marine artillery based at the Rockpile and Camp Carroll was most frequently targeted to the north, northeast, and east of Khe Sanh, in the heart of their range capability. The 105mm artillery based at Khe Sanh was used to engage targets closer to the combat base, as long as the maximum ordinate (peak of their trajectory) was below the 14,000 altitude at which many of the air support aircraft were controlled.<sup>375</sup>

Air power was an especially critical weapon at Khe Sanh for several reasons. Artillery was not very well suited for the destruction of large enemy targets close to the combat base or its outposts, or for heavily reinforced defensive positions. Every artillery round fired from Khe Sanh also had to be delivered to the combat base by the tenuous air logistic chain, putting more aircraft and Marines at risk. Additionally, a single aircraft could attack with more ordnance in a more concentrated punch. A single 500-pound bomb, for example, delivered only slightly less high explosive mass than a whole battery of six 155mm howitzers. A single aircraft carrying several dozen of these bombs, therefore, had more destructive firepower than several battalions of artillery.

The targeting effort at Khe Sanh was run by Captain Mirza M. Baig, the regimental Target Intelligence Officer, whose job it was to mix art and science to find the enemy. The science in the process started with an incomplete picture generated by electronic intercepts, visual sightings, and other information, to generate a picture of where the enemy was known to be. Then, a thorough knowledge of enemy doctrine and tactics was used to fill in as many of the gaps as possible, and create a more complete picture of what the enemy was doing. In essence, Baig was responsible for connecting the dots to reveal the big picture. Here the art of targeting became in-

creasingly important, as the targeteers had to use their intuition to try and divine what the enemy intended to do, how he would do it, and when he would do it.

To start building the picture, targets were identified in several ways. The most accurate was for a forward observer or forward air controller to visually spot the enemy. The thick vegetation and elusive nature of the enemy at Khe Sanh made the detection of significant targets by ground observers in the fixed defensive positions at Khe Sanh a rarity, so aerial sightings by reconnaissance and observation aircraft became particularly important. Although still limited by the vegetation and NVA camouflage and deception techniques, the movement of large combat units into the region around Khe Sanh was accompanied by unavoidable concentrations of people and equipment which often betrayed their own presence. Visual searches for the enemy were also more productive when the NVA began firing artillery at KSCB. Although the NVA went to great lengths to conceal the locations of their artillery, they had to expose them at the time of firing.

Less reliable than visual spottings were electronic intercepts, which could give away enemy dispositions in one of two ways. First, the actual intercept of radio transmissions by two or more locations could be triangulated to determine the location from which they emanated. Second, the analysis of the content of transmissions could reveal information, such as unit identification, location, and intent. Even when not decipherable, the volume of traffic could be used to estimate the size and activity of enemy units. Electronic intercepts were less reliable than visual spottings because the location techniques were not as precise, and transmissions could be easily manipulated for deception, but they helped complete the picture when combined with other sources of intelligence.

There were other, more creative solutions that

attempted to make use of the Americans' technological advantage over the NVA. One of these was the Anti-Personnel Detector (APD), which began to contribute to Niagara at the start of the operation in January.<sup>376</sup> This system was mounted in a UH-1E helicopter and flown over the jungle, where it could detect very minute concentrations of urea in the atmosphere. The urea was theoretically generated by human sweat or urine, and it was believed that the APD could reveal the presence of large concentrations of NVA soldiers that would otherwise have remained hidden in the jungle. Unfortunately, the validity of the concept was never proven in combat around Khe Sanh, and the lack of other evidence led the Marines to conclude that the APD was just as likely to be set off by troops of monkeys and other natural sources as it was by battalions of enemy soldiers.

Early in the battle, before the NVA took actions that revealed their presence in force, the 26th Marines had little idea where the enemy actually was. During this stage, Captain Baig had to depend heavily on the few visual sightings and electronic intercepts he had and was forced to rely on his intuition more than science. During this stage many air strikes and indirect fire missions were targeted on likely and suspected enemy locations—place where the enemy could be—rather than known enemy positions. These missions were known as harassment and interdiction (H&I) fires, because the destruction of enemy assets was too much to be hoped for.

The targeting situation was improved to a large degree after the enemy was discovered in force between 20 and 23 January. In order to accomplish the objectives of Operation Niagara, however, the Americans could not merely wait for NVA units to reveal themselves in their final assaults where heavy U.S. firepower would be useless in close combat. The destruction of enemy combat power around Khe Sanh required the Americans to locate the elusive enemy formations and de-

pots dispersed in the jungles around Khe Sanh. A Niagara intelligence center was set up as an adjunct to the 7th Air Force headquarters at Tan Son Nhut Air Base near Saigon. There, a special team of photo interpreters and analysts was assembled, including specialists brought in from the United States. Despite the huge volume of information processed, however, visual and electronic intelligence proved frustratingly unproductive.<sup>377</sup> On 18 January, General Westmoreland decided to take a significant step toward locating the enemy so that Niagara could be successful.

Up until that time, Westmoreland had kept the electronic barrier component of the McNamara Line as one of his most closely held secrets. The barrier system, code-named Muscle Shoals, consisted of a network of acoustic and seismic sensors which could be dropped by aircraft to monitor the enemy. The Air Force had used the sensors to monitor movement along the Ho Chi Minh Trail since October, but the project had still remained highly classified. While the increasing volume of traffic southward along the trail in November and December were part of the intelligence that led Westmoreland to chose Khe Sanh as his conventional battle ground, very few people knew the actual source of that intelligence. Within the five thousand men assigned to the 26th Marines, for example, only one officer had ever even heard of the program. Now that Westmoreland had chosen his decisive battleground, he made the decision to change all that and risk compromising Muscle Shoals so that he could bring air power to bear against the enemy.<sup>378</sup>

In the few days after Westmoreland made his decision on 18 January, 250 sensors were dropped in various locations around Khe Sanh. The Air Force used the infrastructure that had already been developed for monitoring the McNamara Line and the Ho Chi Minh Trail by adding another aircraft to the daily mix that orbited above Khe Sanh. Its purpose was to collect the data from

the sensors and instantly relay it to a surveillance center in Nakhom Phanom, Thailand. There, the emissions were compared to a signal library to determine exactly what the sensors were detecting. From there, the intelligence was relayed both to the 7th Air Force targeting cell, and back to the 26th Marines FSCC in Khe Sanh, where the data was used for targeting supporting arms. It did not take the Marines very long at all to abandon their program of shot-in-the-dark harassment and interdiction fires when this new intelligence began to identify NVA troop concentrations.<sup>379</sup>

The system had its shortcomings. By the end of January, 316 sensors had been deployed, yielding 99 targets, but the exact locations of the air-dropped sensors were typically 200 to 1,000 meters from where they were thought to have been dropped. This problem was discovered when repeated attempts to use sensor reports to attack up to 150 point targets a day yielded few positive results.<sup>380</sup> The Marine's division commander was well aware of their lackluster performance, stating, "The results were better than H&I fires, but that is saying very little."<sup>381</sup> Instead, the sensors came to be regarded as trend indicators to predict attacks and put defensive fire plans into action.<sup>382</sup> Like other intelligence sources, Muscle Shoals was sometimes used as the sole source of targeting data when there was a complete absence of other indicators, but the sensors were ultimately only trusted when their reports could be confirmed by other, independent sources.<sup>383</sup>

Even so, the sensors were credited with being the predictors of major attacks on 5 February, the night of 29 February through 1 March, and 21 through 23 March. In each of these cases, the FSCC was able to divert air strikes and other supporting arms to sensor-located targets, and the end result was that no significant attack ever reached the Marine perimeters.<sup>384</sup> For this reason, Colonel Lownds considered the sensors to be well worth the \$1 billion-dollar price tag.<sup>385</sup>

The use to which this targeting intelligence was put was another matter all together. It is one thing to detect, identify, and locate your enemy, but it is another entirely to destroy him. To accomplish this, the 26th Marines sought to bring the maximum firepower to bear in the form of supporting arms. Defensively, fire plans were not used to try and prevent the enemy force from reaching the Marines' perimeter wire, but instead to prevent him from escaping or being reinforced once he had committed to an assault—in effect trapping the NVA between a rock and a hard place. To fragment and isolate the enemy, a three-sided box of fire and steel was set up, which was open on the side closest to the Marine defenses. Three artillery batteries fired continuously to form the first three sides of the box, trapping the enemy against the Marine defenses. Then a fourth battery began firing to close the open end, and as the first three batteries kept up continuous fire, the final battery would sweep its fire up and down the inside of the box like a piston within a cylinder, so that there was no way for the enemy to escape the destruction. This box became known

as the primary box, because another was soon added. Heavy 175mm artillery was sometimes assigned to fire linear patterns parallel to the two sides of the box at a distance of approximately 500 meters. To close the end of the secondary box furthest from the Marine defenses, aircraft under radar control would drop their bombs in linear patterns. The secondary box was designed to destroy any NVA units which might attempt to reinforce or assist the unit caught in the primary box. To accomplish this, the three sides of the secondary box would be shifted inwards and outwards, like an accordion.<sup>386</sup>

The use of primary and secondary boxes in defensive fires represented the most ideal combination of supporting arms—the massing of many different types of firepower with decisive, synergistic effects. In most cases, however, firepower could not be massed to that degree, or the targets located were judged not to warrant such an expenditure. It is in these cases, where the effects of the various supporting arms could be individually observed, that close air support can best be evaluated.

# THE DEEP AIR BATTLE AND THE B-52

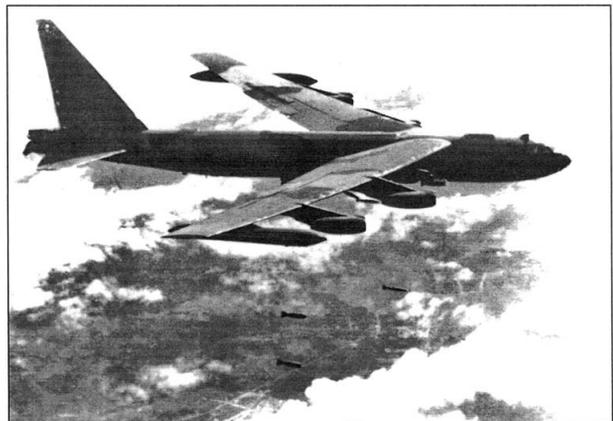
Captain Mirza M. "Harry" Baig, the Target Information Officer assigned to the 26th Marines at Khe Sanh, was perhaps the single most important individual when it came to directing the massive fires support available to the Marines for use against the enemy. He classified the battle into three phases of combat. The first was the attrition of enemy forces by a nightly schedule of artillery, radar-controlled aircraft, and B-52 missions. In daylight hours, those enemies that survived and exposed themselves became targets of opportunity in the second phase: attack by artillery and aircraft under the control of forward observers and forward air controllers. Only those enemies that escaped the saturation bombings and detection by forward observers made it to the third phase of combat, face-to-face confrontations with the Marines at or near the perimeter of the combat base. Of the three phases, Captain Baig declared the first to be by far the most important and effective, and he gave the lion's share of the credit to the massive firepower delivered by the B-52s.<sup>387</sup>

The vast majority of personnel involved in the defense of Khe Sanh during the 77 days of siege who remarked on the support of the B-52 shared Baig's opinion, describing them as the single most decisive factor in the successful outcome of the battle. The most significant feature of B-52 support was the sheer mass of firepower that these huge aircraft could deliver, operating around the clock to apply constant pressure on the NVA forces around Khe Sanh, annihilating those that could be located and targeted in sufficient time. B-52s, delivering their bombs under the code name Arc Light, were responsible for 60.3 percent of the total bomb tonnage dropped at Khe Sanh.<sup>388</sup> The wide acclaim for the B-52, combined with this data, is somewhat problematic to the thesis that the Marine doctrine of close air support was a critical element of the battle, and has also lead to the conclusion of Bernard Nalty and others that the unspecific application of air power

was critical without further comparative analysis. A closer look at the facts, however, reveals that these observers may have been overawed by the destructive power of the B-52. If Khe Sanh was a victory of air power, the B-52 was certainly a very visible champion, but the Stratofortress' effectiveness was also subject to significant limitations.

## Air Support Provided by B-52s

The B-52 was an enormously destructive weapon. Designed for strategic bombing, each aircraft carried a payload of 60,000 pounds of bombs. The typical Arc Light sortie delivered this ordnance on one square kilometer of terrain, achieving full dispersion with a mix of 250-, 500-, and 750-pound bombs, although destructive firepower could be further concentrated by using a smaller number of heavier bombs.<sup>389</sup> Although designed as a strategic weapon, the B-52 was used on an operational and tactical level in the Vietnam War and in subsequent conflicts. In the region around Khe Sanh, for example, as early as the fall of 1966, B-52 raids had been conducted on NVA targets detected by O-1 birddogs during Operation Tigerhound.<sup>390</sup> The use of strategic bombers in these roles was somewhat problematic. To begin with, all of South Vietnam was considered within the bomb line, today known as the fire support coordination line. This meant that any bombing *A B-52D dropping its payload, which could include as many as 30 tons of bombs.*



operations conducted within this area had to be coordinated with friendly units responsible for those areas, as well as the government of South Vietnam, to ensure that they would not endanger friendly forces or the civilian populace.<sup>391</sup> The clearance for such missions was therefore subject to the approval of ground forces under procedures much more similar to close air support missions than strategic bombing missions in enemy territory, which needed little more than the approval of the U.S. national command authority. The additional clearance requirements were met with great resistance by the U.S. Air Force's Strategic Air Command, the agency responsible for the employment of B-52s in all strategic missions, from nuclear deterrence of the Soviet Union to helping win the war in Vietnam. Even before the B-52s were used on targets in South Vietnam, SAC had refused to turn control of its strategic assets over to MACV or CINCPAC to facilitate bombings of targets in Laos and North Vietnam. Instead, targeting was controlled by SAC and its leadership in Washington, D.C., which maintained operational control over all B-52s, even those deployed to Thailand and Guam which regularly flew missions in support of the war effort in Vietnam.<sup>392</sup> SAC considered this arrangement beneficial in two ways. It kept the bombing of North Vietnam under the tight control of the President and the rest of the national command authority, which chose to modulate such bombing in response to the changing international political conditions under which the war was fought. It also allowed SAC to keep all of its bombers ready for the defense of the U.S. if needed, while spare sorties could still be made available to service targets selected by CINCPAC and COMUSMACV to help win the war in Vietnam.

Upon assuming command of the 7th Air Force in July 1966 and becoming Westmoreland's Deputy for Air Operations, General Momyer was responsible for advising COMUSMACV on the most effective employment of all assets at his disposal.

Momyer was opposed to the use of B-52s in tactical support roles. He considered this a waste of their massive firepower, which he thought would be more effectively used on North Vietnam's war-making capability. Momyer thought the B-52s should only be used to achieve tactical objectives in emergency situations, or in other special circumstances which deserved their attention.<sup>393</sup> As he developed the plans for Operation Niagara, Momyer saw just such a situation developing. Envisioning the upcoming battle of Khe Sanh as an opportunity to draw the NVA into easily targeted concentrations, Momyer saw Niagara as a way of using the B-52's to achieve tactical and strategic objectives simultaneously. By using the firepower of the B-52 to destroy large NVA units massed around Khe Sanh, Momyer would both protect the Marines, and attrite the enemy combat power which usually proved so elusive for airpower in this guerrilla war.

The desire to employ B-52s within the ICTZ brought some complications since the Air Force now had to cooperate with III MAF, which not only had a better awareness of the enemy within the ICTZ, but also had veto authority over any bombing mission conducted within its that area which could endanger its ground troops. For this reason, the target selection and clearance procedures for Arc Light strikes around Khe Sanh were very similar to the procedures for close air support missions. The 26th Marines Fire Support Coordination Center would select most targets, sometimes based on targets of opportunity detected by the subordinate battalions, but more often based on a variety of larger-picture intelligence sources, such as radio transmission intercepts and Muscle Shoals sensor reports. The 26th Marines provided 90 to 95 percent of all targeting for the B-52 strikes,<sup>394</sup> but the requests for B-52 support were still submitted up the chain through the 3d Marine Division FSCC, III MAF headquarters, and ultimately to MACV. At Ton Son Nhut Air Base, near Saigon, Westmoreland di-

rected that a special operations center be set up in an empty hanger adjacent to the 7th Air Force headquarters. There a special "red watch" was established and manned 24 hours a day, always under the supervision of either Westmoreland, General Creighton Abrams (his deputy), or Lieutenant General William Rosson (his Chief of Staff). This watch center for monitoring Operation Niagara passed each B-52 support request to Westmoreland, who personally approved every mission.<sup>395</sup>

This request process took some time to complete. The 26th Marines had to submit their initial request at least 15 hours prior to the desired time on target (TOT) for the attack, and most often had to adjust the TOT to fit a preset schedule of TOTs that the Air Force had established for that particular day. Once a flight of bombers was assigned to the mission, the process could be abbreviated if the target needed to be changed, but the expedited procedures still required at least three hours' notice before the attack was to be made.<sup>396</sup> The Air Force, however, was reluctant to short-cut its 15-hour procedure, and on at least one occasion General Westmoreland himself had to intervene to divert B-52s to help destroy an NVA concentration poised to attack Khe Sanh Combat Base.<sup>397</sup> Ultimately, the time required to process and approve targets for attack by B-52s was one of this weapon's main limitations in the battle for Khe Sanh. The B-52 could only be effective if targeted against an enemy which remained in place for at least three hours, or whose position three hours in the future could be predicted with some degree of accuracy.

Of course, the need for accuracy should not be overstressed with a strategic bomber capable of destroying virtually everything within a square kilometer. The B-52s at Khe Sanh were normally scheduled in flights of three. They would fly in an echelon formation, laying a continuous stream of bombs in a target box one kilometer wide and three kilometers long. To facilitate this, the ter-

rain around Khe Sanh was divided into a grid of one-kilometer square boxes, each with an identification number. With this rather blunt weapon, the targeteers merely had to predict which grid square the enemy would be in during the time on target, and pass a series of four-digit numbers to the attacking aircrew via the fire support coordination process.<sup>398</sup> The terminal guidance to the aircraft in the delivery of its ordnance was usually accomplished through a ground-based radar system, although aircraft could also drop using their sophisticated onboard navigation systems.

To support Operation Niagara, Momyer had about 24 B-52s available on a daily basis. Once he notified III MAF that he was making these sorties available to meet the impending threat to Khe Sanh beginning on 16 January, the Marines were quick to take advantage of them. Although III MAF technically maintained the authority to direct attacks on any targets within the ICTZ, General Cushman's staff immediately gave priority for these missions to the 26th Marines so they would be used around Khe Sanh, just as Momyer intended.<sup>399</sup> The Air Force General must have been disappointed, however, with some of the first targets against which his bombers were used. In the first few days, while Operation Niagara was still in the "seek" phase that would precede the "destroy" phase, and before the enemy had yet revealed himself in strength, the Marines sent bombers on 12 large raids. These raids were against targets based on human intelligence collected by Bru scouts, aerial photographs, or radio intercepts, but lacked any strong proof of NVA presence.<sup>400</sup> The Marines were apparently not as efficiency-minded as Momyer when it came to air power, and were willing to send the newly-available assets against any target that might present a future threat to KSCB if better targets could not be found.

Once the enemy began to reveal his presence in force around 20 January 1968, the tar-

gets against which the B-52s were targeted were probably much more to Momyer's liking. Just one such strategic target was identified shortly afterward, on the eve of the Tet Offensive. Radio intelligence revealed the presence of what Westmoreland was convinced was "the north Vietnamese headquarters controlling forces around Khe Sanh, if not the entire region." Located just across the border in Laos, Westmoreland suspected and hoped that Giap himself would be among the NVA leadership assembled there. Deviating from the normal practice of having the 26th Marines select a target for one of the regularly scheduled B-52 strikes, Westmoreland ordered that the Stratofortresses be concentrated to deliver a paralyzing blow to the NVA command system. Thirty-six B-52s were sent out in the single largest air strike of the war to date, dropping 1,000 tons of ordnance on the suspected headquarters location. That same evening, the strike was followed by another composed of nine more aircraft, designed to catch NVA troops and medical personnel, as well as any survivors of the first raid. The radio signals emanating from that location did cease as a result of the raid,<sup>401</sup> and an official NVA operational history on the battle, while notably silent on the matter of casualties, noted that the Campaign Command Headquarters was hit and forced to move, leading to a problematic gap in command and control.<sup>402</sup> Unfortunately for Westmoreland's hopes, Giap apparently escaped harm, far off to the north in Hanoi monitoring the final preparations for the Tet Offensive.

As noted before, such high-level attempts to influence the battle and the war were not the norm. The vast majority of the B-52 missions were requested by the 26th Marines to attack targets they had selected. In order to meet these needs, the Air Force drew upon two SAC bases in the theater. B-52s were provided by the 4133rd Bomb Wing at Anderson Air Force Base in Guam, and the 4258th Strategic Wing, located closer to Vietnam at U Tapao Air Base in Thailand. To pro-

vide relatively continuous coverage, these aircraft were scheduled to arrive on a three-plane cell once every three hours, although the actual times on target were varied in order to avoid a predictable pattern that the NVA could better defend against. After the first week of February, 26 additional B-52s were deployed to Kadena Air Force Base in Okinawa. Although this deployment was in response to the capture of the U.S. Navy signals intelligence ship *Pueblo* by the North Koreans, by 25 February it allowed SAC to increase its support of Khe Sanh to one three-plane cell every 90 minutes. Actual times on target continued to vary between one and two hours to minimize their predictability for the NVA.<sup>403</sup> Another change was made in the last week of February from a three-aircraft cell arriving every 90 minutes to a six-aircraft cell every three hours. While the overall sortie contribution remained relatively constant, this created a more devastating concentration of firepower on a more irregular schedule which was harder for the enemy to predict. The increased interval in B-52 support also forced the Marines to save the Arc Light strikes for only the most appropriate targets.<sup>404</sup> This last point is important because under the more frequent schedule of support there had been wasted effort noted. Rather than send the bombers home without dropping bombs in instances when the Marines had not found any known or suspected enemy concentrations, they had resorted to targeting Arc Light's on very minor enemy positions, like single machine gun nests, or even positions where the enemy was merely likely to be, like intersections of trails and streams.<sup>405</sup> An infantryman would have no complaint about sending a B-52 to attack any enemy squad he might have to face, but this was exactly the kind of wasted effort and overkill that Momyer feared was sapping the Air Force's power to win the war on a strategic level. While the increased concentration of sorties apparently reduced this waste, it also had an adverse effect on Arc Light responsiveness, providing support on a less flexible schedule and

essentially adding three more hours to the minimum response time. On 2 March, Westmoreland reacted by directing the 7th Air Force to develop a procedure for handling requests that would allow a more rapid diversion of Arc Light strikes, which was accomplished.<sup>406</sup>

At the beginning of the Khe Sanh campaign, the delivery of bombs by B-52 was restricted to targets more than 3,000 meters from friendly troops. The reason for this is that the huge volume of bombs delivered from high altitudes created a great danger to U.S. and allied troops near the Arc Light targets. Other forms of air attacks were not subject to the same restrictions. Radar controlled attacks by tactical aircraft, for example, were allowed to attack targets as close as 2,000 meters from friendlies, and visual attacks by tactical aircraft under the control of forward air controllers were permitted to attack as close as the actual destructive radii of the weapons they were dropping.

While the Americans learned some valuable lessons about the potential of B-52s in tactical operations at the battle of Con Thien, just four months before Khe Sanh, the NVA had arrived at some equally valuable conclusions. The NVA had already adopted the tactic of getting as close as possible to U.S. positions to try and deny the Americans the advantage conveyed by supporting arms. At Con Thien, the NVA determined that once they got within 3,000 meters of U.S. troops, they were rarely attacked by B-52s.<sup>407</sup> At Khe Sanh, therefore, they were quick to try and exploit this vulnerability, moving close to U.S. positions to avoid the devastation caused by a B-52 attack.<sup>408</sup> This tactic was observed by the Marines defending the hills around Khe Sanh,<sup>409</sup> and apparently became known to COMUSMACV.

Westmoreland decided to try and deny the enemy any sanctuary that unnecessary safety restrictions created. On 13 February he wrote to

CINCPAC asking for a waiver to the 3,000 meter restriction, emboldened by the knowledge that during Con Thien a B-52 had mistakenly dropped its payload 1,400 meters from friendlies without any adverse effects. In order to validate the technique, permission was granted for a test strike on a target box known as Khe Sanh Red 207, the closest edge of which was just 1,200 meters from the Marine defenses on Hill 881S. The test was successful, although even precautions, which included having the Marines take cover during the attack, could not prevent some of them from getting nosebleeds from the concussions of the bomb detonations.<sup>410</sup> After the test, Admiral Sharp agreed that a waiver was a worthwhile risk, and on 18 February he reduced the minimum safe distance for B-52 missions to just 1,000 meters.<sup>411</sup> The use of B-52s on "close-in" targets became an accepted tactic, although it was generally reserved only for emergency situations. For the rest of the campaign, there were a number of occasions when targeteers took advantage of that reduction, ordering Arc Light strikes close to the new minimum safe distance. There is even one case when B-52s delivered ordnance just 900 meters from friendlies, although it is not clear whether this was entirely intentional.

The reduction in standoff was important for several reasons. First, it reduced the sanctuary that the NVA had been given from this fearsome weapon and increased the utility of the B-52 for fighting the NVA at a more critical stage of the battle. With the reduced standoff the B-52s could now be targeted at NVA who had actually been observed as specific locations by human eyes on the combat base and its outposts, not just on radio emissions or sensor reports. In addition, it allowed the B-52s to attack the NVA as they were concentrating for attacks on the Marine positions. Finally, it placed these attacks within the observation of human eyes, so that their effects could be more accurately judged. The testimonials on these missions are impressive. Captain Bill

Dabney, commanding the key defensive position on Hill 881S, stated,

we had the B-52s and they were awesome when they turned them on. You know, we figured we could handle anything that came in close if they could break up the attack. And they damned sure could break up the attack if you could give them a target. And in terms of responsiveness, they were fairly fast. I mean to the point where I remember one time we reported some movement and noise and apparently lights on a ridge directly south about 1100 to 1200 meters away. And it was less than—now this is a hazy recollection—but I bet it was less than two hours before we had an Arc Light. And if you've ever been within a click of two of an Arc Light, it's pretty awesome in terms of what it can do to an enemy formation that's massed for attack.<sup>412</sup>

The B-52 had admirers at all levels. A lance corporal defending the perimeter of KSCB itself remarked,

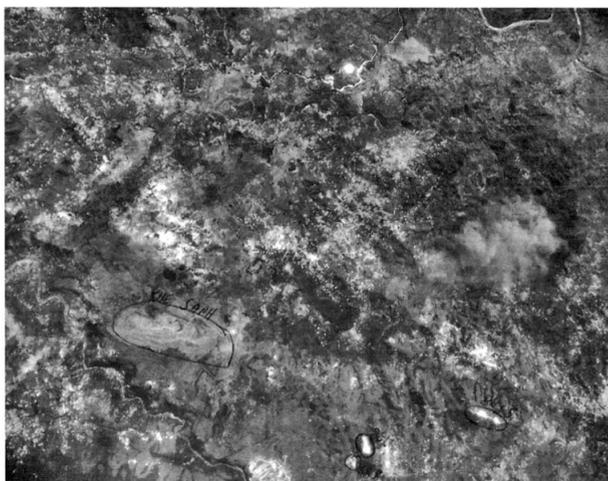
The air power displayed was incredible. There were constant bombing runs by all kinds of fixed-wing aircraft. By far the most impressive were the B-52 bombing runs. The ground would actually rumble under our bodies as we lay in a bunker while the bombs erupted around our perimeter. I often wondered how the NVA withstood the constant pounding.<sup>413</sup>

The enemy seldom attacked KSCB itself in force, so it was rare that B-52s were targeted close to the combat base. On exception was on 29 February, when a possible enemy buildup was suspected near the garbage dump and French plantation house to the south. Since sensors detected movement on two axes toward the base, the 26th Marines requested the emergency divert of a B-52 strike to these relatively close targets, and

got approval.<sup>414</sup> Colonel Lownds reported, "This was the only time that the kids on the lines told me...that they actually saw bodies being thrown into the air." Colonel Lownds concluded that the strike broke up an attack by what was probably an NVA regiment,<sup>415</sup> and NVA sources confirm that an assault (probably by the 9th Regiment of the 304 Division) was launched and defeated that night.<sup>416</sup> The paradox of gauging B-52 effectiveness, however, was that the destructive firepower of these bombers seldom left much definitive evidence to quantify what they had actually accomplished.

Even more important than the American observations, therefore, are the NVA reactions to Arc Light strikes. All evidence indicates that the B-52 was a particularly feared weapon. Westmoreland was quoted as saying, "We know, from talking to prisoners and defectors, that the enemy troops fear B-52s, tactical air, artillery, and armor...in that order;"<sup>417</sup> and stated that captured documents indicated that NVA units had suffered a 20 to 25 percent desertion rate due to the soldiers' fear of

*An aerial photograph of the area around Kbe Sanb Combat Base, located in the lower right and circled in pen on the original photo. The linear patterns of light spots are the result of B-52 strikes. The landscape around the combat was heavily scarred by the heavy bombardment.*





*A B-52 strike was impressive, not only for the sheer destruction it created when it seemed to obliterate an entire valley or ridgeline at a time, but also for its suddenness. In the foreground, two Marines can be seen watching the strike from inside a sandbagged trench.*

U.S. air power.<sup>418</sup> The diary of one soldier killed in the battle reflected that while moving southward under the pressure of American air power to replace casualties in the 304th Division, three hundred men had deserted rather than face the feared B-52.<sup>419</sup> The 304 Division's official history acknowledges that one of its battalions was so devastated by a B-52 strike that subsequent desertions and self-inflicted wounds to avoid combat caused the NVA leadership to doubt that the battalion would be of any further use at Khe Sanh.<sup>420</sup> In March, an NCO assigned to the same division wrote, "Here the war is fiercer than in all other places...All of us stay in underground trenches...We are in the sixtieth day and B-52s continue to pour bombs...this is an area where it rains bombs and cartridges. Vegetation and animals, even those who live in deep caves or underground, have been destroyed."<sup>421</sup>

One reason why the B-52 was so feared was not only the unbelievable destruction it caused, but also the fact that the obliteration of several square kilometers of terrain was seldom accom-

panied by any warning. As one private first class at KSCB observed,

A B-52 strike was truly awesome. There would be no hint of a strike arriving until the bombs exploded. The bombs fell in a staggered pattern. First one bomb, then another to the right and front of the first explosion, then another to the left and front of the second explosion, and so forth. The bombs created a long pattern of craters, churned up earth, and blasted trees. After the bombs had exploded, I would be able to hear the planes. They produced a weird, low moaning that lasted until they were out of range. I never saw the planes, since they bombed from a great height.<sup>422</sup>

A first lieutenant related an occasion when the Marines were warned of a strike about to be delivered outside their lines:

It was still overcast at the appointed time, 1700, and we all looked up into the sky. Nothing. But three or four minutes later,

we heard this eerie sound—a bubba-bubba-bubba sound...Suddenly, the whole ridge-line exploded from one end to the other... It was a sight to behold, a mountain blowing up right in front of us.<sup>423</sup>

Also describing an Arc Light strike, General Rathvon Tompkins, the commanding general of the 3d Marine Division, added, "It was as if a little part of the world suddenly blew up from no apparent cause."<sup>424</sup>

When the enemy could be detected at sufficient distances from friendly lines, and obliged the American by staying in the same positions for a long enough time, the B-52 could certainly be a fearsome weapon. It is unlikely, however, that the enemy was in fact frequently so cooperative in the battle of Khe Sanh.

### Limitations of the B-52s

The effectiveness of B-52s in supporting the ground battle of Khe Sanh (which was never surpassed throughout the war) was bound by three fundamental limitations: the predictability of their attacks, their three-hour response time, and the inability to attack targets closer than 1,000 meters from friendly troops. With regard to the first, Robert Pisor offers several pieces of evidence gathered from NVA sources indicating that the enemy may have used communications intercepts or sources inside the U.S. air command and control system to help them anticipate and avoid B-52 strikes. Even if that ultimately proves to be untrue, it is clear that they managed to exploit the predictability of the B-52 attacks to reduce their losses,<sup>425</sup> and that U.S. air planners had to take active steps to reduce this predictability.

The last two limitations, responsiveness and stand-off from friendly troops, have already been explained, including the measures taken to mitigate each one. Despite such measures these limitations remained fundamental obstacles to use of

B-52s in close air support, since by definition this involved the delivery of weapons in close proximity to friendly forces, requiring detailed integration with the fire and movement of those forces. The B-52 was not a weapon for the resolution of dynamic pitched battles fought by the ground commander, although it did reach its peak utility by attacking known and suspected enemy concentrations around the uniquely static defensive positions of Khe Sanh. The only deconfliction with "maneuver elements" required at Khe Sanh was in the opening stages of the battle when the 26th Marines FSCC deconflicted proposed strikes with the positions of long-range Special Forces patrols tracked by an Army captain attached to its staff.<sup>426</sup> In any situation more dynamic than Khe Sanh, the B-52 could not have been as effective a weapon. This conclusion is not only supported by prominent historians of the battle like Ray Stubbe,<sup>427</sup> and by NVA sources which indicate a 40 percent reduction in the percentage of casualties inflicted by air strikes in the mobile stages of this battle,<sup>428</sup> but also by the campaigns which followed. Captain William Dabney, the commander of the defenses on Hill 881S and an ardent fan of the B-52 as a "close air support" weapon at Khe Sanh, had the benefit of serving as an advisor to an ARVN operation in the same region three years later. During Operation Lam Son 719, MACV attempted to use B-52s in a similar role with maneuver forces, but found that the increased number of firebases made clearance of these missions prohibitive. As a result, the B-52s were forced to bomb more than eight kilometers from the key battles in an effort to avoid hitting friendly troops.<sup>429</sup>

The fact that B-52s were not true close air support aircraft does not negate the popular claim that the Stratofortress was the decisive weapon of the battle. There are also, however, no concrete facts to support this claim. The testimonials of Marines awed by the destructive firepower of B-52s in the hills around Khe Sanh reflect obser-

vations on a minority of missions. Only 23.1 percent of the B-52 sorties flown in support of Operation Niagara were classified as close-in missions, where their effects could be readily observed.<sup>430</sup> Even so, as noted in Colonel Lownds' testimony, the Marines were awed by the destructiveness of the Stratofortress on terrain, not because of the effects observed on enemy weapons and equipment. While the procedures developed at Khe Sanh for the close-in tactical employment of B-52s undoubtedly contributed to the American success at Khe Sanh, and improved the utility of the Stratofortress later in the war, especially the critical conventional battles of 1972,<sup>431</sup> there was no quantification of their effectiveness even in the most highly observed of their missions, which were a distinct minority.

Even today, there is only one quantitative measure of B-52 effectiveness in the battle for Khe Sanh based directly on known casualties inflicted. The official NVA campaign history reports that the 325 Division sustained 4 percent of its casualties due to B-52 strikes while in bivouac or movement, 18.8 percent of its casualties due to air (assumed to be tactical air strikes) or artillery while in bivouac or movement, and 63.1 percent of its casualties "wounded in action" (a statistic which likely includes the effects of some B-52 and some strikes by tactical aircraft). More impressive for the B-52, the 304 Division reported that it suffered 20 percent of its casualties to B-52 strikes while in movement, and 77.4 percent wounded in action. Most other casualty samples suggest that about 60 percent of those casualties classified as wounded in action were inflicted by air strikes of one form or another.<sup>432</sup> If these sources are to be trusted, they do suggest that in some cases the B-52 could inflict an impressive amount of damage in the deep battle, but they do not prove that the B-52 was the decisive weapon of this campaign.

Even this information was unavailable to the

Americans at the time, so it remains to be shown why numerous senior officers, especially within the 7th Air Force and MACV staff which planned Operation Niagara, endorsed the contribution of the B-52 as an unqualified success. They had several reasons to arrive at this conclusion, but unfortunately none of them are grounded in solid facts. More than half of the Arc Light sorties delivered at Khe Sanh were not only outside the range of ground observers, but were also delivered at night and during periods of heavy cloud cover, making aerial bomb damage assessment impossible. This was part of a larger trend in the Vietnam War. As one Air Force historian has determined, aerial photographic analysis could only accurately interpret the results of about 7 percent of the Arc Light missions. For the Khe Sanh campaign specifically, Air Force BDA officers reported that the total confirmed B-52 destruction for Niagara was only approximately 270 defensive positions and another 17 weapons positions.<sup>433</sup> The official assessment for Operation Niagara (shown in Table 2), however, does not give the B-52s credit for the confirmed destruction of a single enemy soldier, vehicle, or structure. The difference may be the result of a questionable BDA technique: the counting of "secondaries."

A "secondary" is the sympathetic detonation of highly explosive materials in a target area caused by the "primary" detonation of the actual bombs themselves. A secondary explosion is generally accepted as proof positive of a very successful bombing attack because it cannot occur unless the bombs are properly targeted and dropped on enemy materials. Unfortunately, the counting of secondaries as a measure of bombing effectiveness was flawed. To begin with, the reporting of secondaries in air combat was roughly analogous to the "body count" which became so infamous during the Vietnam War. For a Stratofortress crew flying more than 20,000 feet above their target, there was no way to measure the effectiveness of their attack other than to look for secondar-

ies. Every combat mission debrief solicited some measure as to the success of the mission, leaving the aircrew with nothing but the reporting of secondaries to personally justify their efforts and quantify their success. Even more vexing was the fact that even well-intentioned B-52 aircrew could not be entirely accurate in their observations. Ray Stubbe points out for example, that these crews were not informed about artillery missions being fired into their target grids at the same time they were conducting bombing attacks. Aircrew observing the detonations of artillery rounds could easily mistake them for secondaries generated by their own bombs, and often did.<sup>434</sup> The result is that aviators would report secondary explosions as proof that they had destroyed enemy war materials, when in fact there was no evidence of any such success.

There were very clear cases when accurate secondary reports clearly proved the destruction of enemy war making potential. In late February, for example, B-52s were diverted to attack two NVA ammunition dumps which had been located. Explosions were seen in the target area for 40 minutes after the bombing ended—very clear evidence that an ammunition stockpile had been accurately located and destroyed.<sup>435</sup> Other than

that, however, there is no report on how much ammunition was destroyed, what personnel may have been killed at the same time, or exactly what impact this had on the enemy's ability to attack Khe Sanh. When the 7th Air Force, therefore, reported that B-52 crewman had observed 1,382 secondary explosions and 108 secondary fires during Operation Niagara,<sup>436</sup> this statistic, which represents only 25.2 percent of the total obtained by all air attacks, should be regarded with suspicion in terms of both quantity and quality of observation.

The next problem with evaluating the effectiveness of the B-52 was the lack of positive bomb damage assessments. While there were a number of instances when the Muscle Shoals acoustic sensors listened to target areas when bombs and artillery were delivered, and heard NVA screaming as a result, this was neither a frequent occurrence, nor a necessarily accurate means of assessing damage. Since there were no reconnaissance patrols sent out from the combat base for the vast majority of the siege, there were few opportunities to actually observe the results of bombing missions. The sheer destructiveness of the massive bombings made what few opportunities existed nearly as futile, since the evi-

*Table 2. MACV Cumulative Bomb Damage Assessment for Operation Niagara, from MACV Evaluations Memorandum, "An Analysis of the Khe Sanh Battle," 5 April 1968, TAB A.*

	7th Air Force	B-52	Navy/ Marines	Total
Secondary Explosions	2215	1362	1128	4705
Secondary Fires	1173	108	651	1932
PersonnelKBA	650		638	1288
Trucks (Destroyed/Damage)	204/37		49/15	253/52
Gun Positions (Destroyed/Damaged)	135/18		165/25	300/43
Bunkers (Destroyed/Damaged)	216/19		675/80	891/99
Structures (Destroyed/Damaged)	564/52		497/106	1061/158
Tanks (Destroyed/Damaged)	4/0		5/4	9/4

dence was annihilated or buried, as was several square kilometers of jungle and earth around it. This, therefore, is the paradox of measuring B-52 effectiveness at Khe Sanh: in cases where it was effective, it left no positive proof.

The most common reason that B-52s were given so much credit for the victory at Khe Sanh, therefore, was that expected enemy attacks never materialized. There are several cases where Muscle Shoals sensors gave clear warning of impending attacks, which failed to develop after Arc Light and artillery missions were used to interdict them. On a macroscopic scale, however, this logic is flawed. To say that the interdiction of B-52s was the decisive factor in winning the battle because it prevented an attack by more than two NVA divisions which had massed to strike Khe Sanh is flawed. Most fundamentally, this conclusion is voided by the fact that there is no definitive evidence that the NVA ever meant to seize Khe Sanh in the first place. Throughout the battle, the Marines waited for a major combat assault on the combat base which never came, and the enemy eventually faded away into the jungle. There are a number of historians and officers who were present at the time who believe that this was purely a matter of Giap's choosing, and that Khe Sanh was merely a cleverly executed deception designed to draw U.S. forces and attention away from the coastline in order to increase the success of the Tet Offensive. It has already been shown that the truth is probably somewhere in between, and until more trustworthy North Vietnamese records about the battle become available and prove otherwise, it would be best to assume that the NVA were only willing to sustain limited casualties in their encirclement of the combat base.

In summary, although a large number of witnesses were clearly impressed with the firepower delivered by the B-52 at Khe Sanh, there is no definitive proof that this was the decisive weapon of the battle. Perhaps the most credible partici-

pant of the battle with respect to this matter is Captain Baig, the officer responsible to targeting the enemy. Unfortunately, he obviously fell guilty to some dangerous assumptions when he stated that the reason why the 26th Marine's supporting arms were so effective was that

Tonc's revelation of the concept of operations, prior and detailed knowledge of the NVA methodology, the requirements of siege warfare, and the lessons of Dienbienphu and Con Thien, gave the intelligence and target team all the information we needed to plan the nature of the supporting-arms countermeasures. Though on occasion I had cause to question the accuracy of my assumptions, nevertheless events tended to prove that we were correct.... But some of the credit must go to General Giap and the NVA. They gave us a good fight, and in the process they destroyed themselves. A man and a force, both known as past masters of guerrilla warfare, infiltration techniques, and siege tactics, were finally revealed as stolid, rigid, inflexible, and unbelievably foolish opponents.<sup>437</sup>

With the benefit of considerable hindsight, what is now revealed as a rather triumphalist assessment suggests that Baig's endorsement of the B-52 as the most significant weapon of the battle should be balanced by the viewpoints of other, well-qualified, participants. None other than his fellow targeteer, Major James Stanton, the 26th Marines Assistant Fire Support Coordinator, held a more balanced point of view which shows a little more respect for Giap as the talented strategist history has shown him to be. Stanton stated,

One school of thought has it that the NVA opened the siege in order to fix a reinforced regiment of Marines in an unimportant corner of the country and oblige us to divert thousands of sorties away from the real Tet objectives, such as Hue City and Saigon. That

is a legitimate observation from a strategic point of view. Another school of thought has it that we wanted to be there because Khe Sanh lay astride their major infiltration route from North Vietnam. In fact, they were going around us, but if we had been able to patrol actively out of the combat base, we would have been able to wreak havoc on the infiltration routes. So this school of thought feels that the NVA pinned us inside Khe Sanh to relieve pressure on the infiltration routes.<sup>438</sup>

While Stanton proposed some pretty big questions about the conventional celebratory conclusions at Khe Sanh, one thing is clear. It is by no means certain that the application of massive airpower, especially by the battle's conspicuous and favored champion—the B-52—won the day. Just as important, the unique conditions that allowed the B-52 to be employed in the first place, like a

static defensive position under a large scale conventional NVA assault, would seldom, if ever, be replicated.

Even if it is assumed that the destructive potential of the B-52 was fully realized at Khe Sanh, it is not the whole story. At the time of the battle, the tactical air attacks which are so often overlooked by historians were actually a well-known complement to the B-52. As noted earlier, Westmoreland pointed out that the statements of NVA prisoners and defectors revealed that “enemy troops fear B-52’s, tactical air, artillery, and armor...in that order [emphasis added].”<sup>439</sup> showing that the enemy had a great respect for this dimension of air power. Perhaps a greater compliment was indirectly paid by the great advocate of the B-52 at Khe Sanh himself, General Momyer, who declared in his analysis of the battle, “In addition to the fighter strikes, B-52s also made a significant impact on the enemy’s efforts [emphasis added].”<sup>440</sup>

# RADAR CONTROLLED TACTICAL AIR SUPPORT

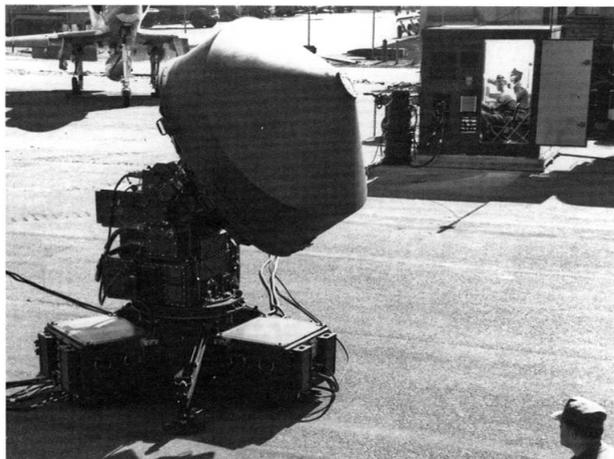
For purposes of analysis, it would be convenient to categorize the air support provided at Khe Sanh into two groups: deep air support (DAS) provided by the strategic bombers of the Air Force, and close air support (CAS) provided by tactical aircraft of the Marine Corps. Reality, of course, defies such academic simplification. Both services, for example, “crossed the line” between DAS and CAS when it came to their contributions. Another matter which significantly obscures a comparison of the contributions of the two services was their use of ground-based radars to provide terminal guidance to both deep and close air support sorties. In fact, approximately two-thirds of all bombing missions over Khe Sanh, DAS and CAS, were controlled by these radars.<sup>441</sup> Both the Air Force and the Marine Corps provided such systems to support the battle, increasing the capability of the United States to apply air power in the defense of the outpost. The Marine TPQ-10 system, however, was a more accurate and responsive system developed in anticipation of such battles, while the Air Force MSQ-77 Skyspot was a reaction to unforeseen shortcomings which could not match the performance of the TPQ-10 and the Marine Air Support Radar Teams (ASRT’s) that ran it.

## The Marine Air Support Radar Team and TPQ-10

The Marine Corps developed its air support radar in response to a critical vulnerability identified during the conduct of close air support in previous wars. Close air support, primarily executed through the visual acquisition of targets or reference marks, was dependent on favorable weather conditions to be effective. Low visibility or low cloud ceilings often made targets difficult or impossible to observe from the air, rendering them safe from air attacks with any degree of accuracy. For an organization as dependent on the heavy firepower of air support as the Marine Corps was, this meant that poor weather condi-

tions could bring an entire operation to a halt, and make the Marines vulnerable to enemy attacks. With the improvement of radar technology, the Marine Corps experimented with several techniques to solve this problem. One idea was facilitated by the development of the A-6A Intruder, an all-weather attack aircraft. This heavy tactical bomber carried an onboard radar for navigation and the attack of fixed targets during adverse weather conditions and nighttime. In order to adapt this system for attacks on fleeting targets in dynamic battles where CAS was needed, friendly forces were equipped with radar reflectors. Since these reflectors could be easily spotted by the A-6 radar, a forward air controller could give the aircrew a direction and distance to offset their attack from the radar reflection in order to hit the enemy. This technique was attempted at Khe Sanh in November 1967, when a reflector was installed on Hill 881S. Unfortunately, that particular reflector proved incompatible with the A-6 radar,<sup>442</sup> rendering this particular technique ineffective at Khe Sanh. The system was later improved by providing the ground FAC with a radar beacon which transmitted on a frequency visible to the A-6 radar. RABFAC (Radar Beacon Forward Air Control) missions were successfully executed later in the siege and the rest of Vietnam War, as well as during the Persian Gulf War of 1991, but the system only allowed A-6s, providing only a small minority of the air support sorties available, to deliver CAS in poor weather. Another system was required to harness radar technology and allow any aircraft to be directed in a “blind” attack with a high degree of accuracy.

That technology was manifest in the TPQ-10 air support control radar. The story of its development was a feat of enough significance that in his seminal work *First to Fight*, Lieutenant General Victor Krulak classified it as one of the great examples of the Marine Corps’ innovative nature, along with the development of landing craft and amphibious tractors for World War II. The idea



*A static display of the AN/TPQ-10 system at Point Mugu, California, in 1962. In the foreground is the precision tracking radar and in the background on the right is the control van. The van was originally nicknamed a "heli-hut" to emphasize that the entire system could be moved around the battlefield by helicopter. Inside the open door of the control van, two Marines of an Air Support Radar Team can be seen seated at the monitors, as they would be when guiding an aircraft to a computed release point to put its bombs on target. The static display also includes an A-4 in the background on the left, which is significant because the A-4 was designed only for bombing in daylight and permissive weather conditions. The TPQ-10, however, could be used to put a Skyhawk's bombs on target day or night, and in any kind of weather.*

of such a ground-based air support radar evolved from a brief Marine experiment in guided missile technology in 1950, when officers assigned to the test unit saw potential not for guiding missiles to a target, but for guiding aircraft to the proper positions in the sky to release their bombs on targets they could not see. Since such a capability would allow continued air support of ground battles during nighttime and poor weather conditions, the potential advantages were immediately apparent. The first version of this system was the MPQ-14. After achieving hits with errors of less than 50 yards in tests, the system was deployed to Korea in July 1951, where it provided Marine CAS

aircraft the capability to deliver weapons from higher, safer altitudes with great accuracy, regardless of darkness or poor weather.<sup>443</sup> The capability was the result of both individual and institutional commitments to exploring all opportunities for improving the quality and dependability of air support for Marine operations on the ground.

The TPQ-10 was the replacement for the Korean War's MPQ-14. This radar was capable of tracking most aircraft up to 35 miles away, although aircraft equipped with radar beacons could be tracked up to 50 miles away. The radar was designed to provide steering information to any attack aircraft to guide it to targets identified by the FSCC. The radar's computer tracked the aircraft, then used its speed and altitude to calculate a proper release point to hit the desired targets with the specific ordnance being employed. The radar operator then passed steering commands to the pilot by voice over the radio to get the aircraft to the proper release point, and told the pilot when to drop his bombs. With certain types of aircraft (such as the A-4, A-6, and F-4B) the TPQ-10 could actually be electronically linked to the aircraft autopilot, so that once the pilot gave his consent, the ground crew could steer the aircraft and drop its ordnance without talking to the pilot.<sup>444</sup> In essence, the TPQ-10 extended the TACP's positive control of aircraft, which usually required the aircraft to be in sight, to non-visual conditions. With this system, even at night and in poor weather the TACP could be sure not only that ordnance would be delivered on target, but also that it would not be accidentally dropped on friendly troops.

The TPQ-10 and its ground crew, known as an Air Support Radar Team (ASRT), were part of a Marine Air Support Squadron (MASS). The ASRT was designed to work in close conjunction with both a DASC and its supported FSCC, where it could have timely situational awareness to sorties available, as well as the ground scheme of maneu-

ver and ground commander's needs. At the start of 1968, there were two MASSs in Vietnam, which maintained a total of five ASRTs. Two ASRTs supported the 3d Marine Division at its Dong Ha headquarters, while a third supported from Phu Bai. For the 1st Marine Division one ASRT was located at Da Nang, while a second was based at Chu Lai. It was this last team, ASRT-B (pronounced "as-rat bravo"), which was moved to Khe Sanh on 16 January 1968 with its associated TPQ-10, just as the NVA attack on the combat base appeared imminent. The electronics van which housed the radar operators and the bulk of their equipment was converted into a reinforced sand bag bunker, and was operational by 20 January, the very eve of the siege.<sup>445</sup> The TPQ-10 remained in operation throughout the entire siege, even after a direct hit on the roof of the van by an NVA rocket. In the first month alone it guided more than 4,200 sorties, delivering 20,000 tons of ordnance on 2,880 targets.<sup>446</sup>

From first day of operations, the TPQ-10 was able to direct aircraft in attacks closer to friendly lines than the B-52. While Arc Lights were initially restricted to attack outside 3,000 meters, the TPQ-10 was certified to guide attacking aircraft as close as 1,000 meters from friendly troops. From the start, the Marines made every effort to reduce this limitation. As early as 29 January, the 3d Marine Division had begun arranging for the delivery of a more accurate X-band radar to its most critical outpost, the combat base at Khe Sanh.<sup>447</sup> Once installed, the improved TPQ was able to control aircraft in to significantly closer distances. Under the standard operating procedures, 500-pound bombs could be dropped as close as 500 meters from friendlies, while 250-pound bombs could be brought as close as 250 meters. These decreased restrictions reflected the fact that the accuracy of the radar was no longer considered a limitation, only the destructive radius of the bomb detonation itself. Strikes as close as 500 meters became routine, and under extreme circumstances the

ASRT even controlled attacks on targets just 35 meters from friendly lines.<sup>448</sup>

The support of the TPQ-10 proved critical at Khe Sanh, especially during the crachin of February, which brought thick, low-lying clouds that blanketed the ground like fog for days on end. In one 24-hour period alone, 18 February, ASRT-B controlled Marine Corps, Navy, and Air Force aircraft to deliver 480 tons of ordnance on 105 targets. By the end of the campaign, ASRT-B controlled nearly 5,000 missions.<sup>449</sup> As stated by the Assistant Fire Support Coordinator of the 26th Marines, "integration of the ASRT (ground support radar team) [sic] and Marine Corps fire support coordination apparatus was a brilliant but overlooked accomplishment which saved our bacon many times during low visibility...when other close air support couldn't be used."<sup>450</sup>

The TPQ-10 was instrumental in controlling attacks in a number of ways besides replacing the visual close air support techniques that were possible only in daytime and clear weather conditions. The TPQ, designed to guide attacks on targets which could not be seen because of darkness or heavy weather, could also be used in attacks on targets that could not be seen because they were hidden by jungle, or because they were too far from Khe Sanh. In this way, the TPQ-10 was used to guide aircraft to attack targets identified by spotter aircraft and sensors. The ASRT was frequently employed in controlling such deep air support missions, and the Khe Sanh FSCC was innovative in maximizing its effectiveness in such efforts. One technique used when B-52s were not available or when there was insufficient time to get approval for a new Arc Light target all the way through Saigon, became known as the "Mini-Arc Light." The idea was to combine the other fire support assets and mass their attacks in a single devastating strike to mimic the destructiveness of the B-52. Under this technique, ASRT-B guided attack aircraft (usually A-6s) against area targets

1,000 meters long and 500 meters wide, while artillery was fired to deliver its rounds (with trajectories deconflicted with aircraft flight paths) simultaneously at a single TOT. Although the ordnance massed was lighter than that of an Arc Light, and the target box attacked was smaller, the result was a more flexible and responsive attack which could be delivered closer to friendly lines.<sup>451</sup> A mini-Arc Light could be coordinated in about one hour's time, and was considered so successful that the 26th Marines FSCC took it one step further. To attack an even smaller target area of just 500 meters by 500 meters, a "Micro-Arc Light" would be coordinated and executes just 10 to 15 minutes after the target was identified.<sup>452</sup> It can be seen therefore, that the ASRT was responsible for increasing the responsiveness, and therefore the effectiveness, of the deeper air battle.

Mini- and Micro-Arc Lights were not restricted to deep targets, like the "major NVA headquarters" obliterated in the second week of February with 152 five hundred-pound bombs dropped by six Marine jets and 350 artillery rounds. During the height of the enemy attack, a nightly average of 3-4 mini-Arc Lights and 6-8 micro-Arc Lights<sup>453</sup>

*Two A-6 Intruders flying low and level in a tight tactical formation near Khe Sanh. Such formations would be used when under TPQ-10 control to mass the bombs of both aircraft on the target coordinates put into the radar's computer, as when conducting a "micro-Arc Light" mission.*



were directed against enemy siege works being dug only 500 to 1,500 meters from the combat base perimeter.<sup>454</sup>

The TPQ-10 was also used to guide aircraft in other creative fire support plans. The primary and secondary boxes, for example, were both means of systematically covering pieces of terrain with destructive fires to support offensive and defensive operations. Since the objective was to isolate, entrap, and destroy enemy that were within those boxes, the pilots had to deliver their ordnance at precise locations and on pieces of terrain without the benefit of visually distinct targets or aiming points. The easiest way to do this, regardless of the weather conditions, was to have the ordnance delivered under TPQ-10 control, which could do so reliably without the benefit of visual reference points. This technique was credited with preventing a reserve battalion from joining to support the assault battalion in the attack on Hill 861 on the night of 5 February. As a result, the hill was successfully defended, despite the enemy battalions wasted in the effort.<sup>455</sup>

The innovation practiced by the 26th Marines FSCC in its fire support planning spread to the men of ASRT-B. No ballistic tables had been developed for the delivery of napalm under TPQ-10 control, so ASRT-B and the FSCC worked to obtain permission to develop their own tables. Tests were conducted against more distant targets where safe deliveries could be confirmed by a FAC's visual observations. Once the ASRT developed its own tables for the accurate delivery of napalm by low-flying aircraft, the defenders of Khe Sanh were able to tactically employ it at night, and in other circumstances when visual control was impossible, adding to the arsenal available for their defense.<sup>456</sup> As the Air Officer for the 26th Marines summarized, "I cannot imagine what would have happened at Khe Sanh if we had not had ASRT-B. They were always 'up,' always on target and always innovative."<sup>457</sup>

Such endorsements of the TPQ-10 were not uncommon once its value was proven at Khe Sanh. Colonel Lownds himself was more impressed with the contributions of the ASRT missions than he was with the less flexible and discriminate firepower of the B-52, stating,<sup>458</sup> “Anything but the highest praise would not be enough.”<sup>459</sup> General Krulak also considered it a “major factor in meeting the needs for round-the-clock fire support of the base,”<sup>460</sup> and agreed with the assessment that TPQ-10 guided support was of greater importance than B-52 missions.<sup>461</sup>

### The Air Force MSQ-77 Combat Skyspot System

Ground radar control of attack aircraft was not a capability unique to the Marine Corps, since the Air Force had a similar system in Vietnam about a year and a half prior to the siege of Khe Sanh. In his memoir, General Momyer claimed that this system was modified from a gun-laying radar used by the Army Air Corps in Italy during the Second World War. He asserted that the technique was in regular use during night and poor-weather missions for the remainder of World War II and the Korean War,<sup>462</sup> suggesting that the Air Force valued and preserved this capability. If this was true, however, it is hard to explain why the Air Force lacked such a system in the humid, rainy climate of Vietnam until late in 1966. Most Air Force historians, including Bernard C. Nalty, John Schlight, and John J. Sbrega, point to the loss of the A Shau Special Forces Camp in March 1966 as a “wake-up call” for the Air Force in Southeast Asia when it came to the requirement for an all-weather capability. During this incident ceilings of 300 to 500 feet severely constrained the ability of the few O-1 FACs and fighter bombers that could get below the weather to support the defense of the isolated outpost.<sup>463</sup> The swift fall of the camp was on Westmoreland’s mind when he later contemplated the air defense of Khe Sanh.<sup>464</sup> It likewise motivated the Air Force to find new ways to en-

sure that its tactical air power would not be rendered useless by poor weather.<sup>465</sup>

Sometime before the fall of A Shau, Momyer’s predecessor as the head of the 7th Air Force, Lieutenant General Joseph H. Moore, visited 1st MAW and saw the effectiveness of the TPQ-10. He urged the Air Force to develop a similar capability, which it did by adapting a training system known as the MSQ-77 Skyspot. This system was designed to track aircraft during training sorties and score simulated bomb drops on U.S. cities by predicting the point of impact of their bombs. This system was reconfigured to control aircraft in attacks prior to March 1966, but the disaster which occurred at A Shau gave new urgency on the program. Once converted to a system known as Combat Skyspot, it was less mobile than the TPQ-10, but had longer range and provided a similar capability.<sup>466</sup> The MSQ-77 could track beacon equipped aircraft up to 150 miles away, and by 1967, five sites in Southeast Asia provided coverage for all of South Vietnam, Route Package I just north of the DMZ, and most of the Laotian panhandle. Later additions in Laos allowed coverage of Route Package VI, north of Hanoi.<sup>467</sup> The Air Force was quick to make use of the new capabilities provided by this system, whose benefits were obvious in the poor Indochinese weather. By the end of the war one quarter of all strike missions had been controlled by the MSQ-77. By the end of 1966 Combat Skyspot became the primary means for directing Arc Light strikes, since there were few targets large and radar-reflective enough to be detected by the B-52s onboard systems.<sup>468</sup>

Combat Skyspot was not as accurate as the Marine TPQ-10, yielding only a 72-meter circular error probability (CEP) in testing. For this reason, MACV prohibited the use of the MSQ-77 to control missions closer than 1,000 meters from friendly troops without the explicit authorization of the ground commander. Requested deviations

from this standard sometimes brought attacks within 500 meters of friendlies.<sup>469</sup> This was still a far cry from the TPQ-10, however, whose miss distances were typically less than 50 meters, especially when one considers that the main cause for such errors was imprecise target location fed into the targeting system, rather than limitations within the radar equipment itself.<sup>470</sup> The first historian to document the battle stated that at Khe Sanh the TPQ was always within 40 meters of the target on the first drop, and that there was virtually no error after adjustment. To ensure that the system was able to consistently deliver this high degree of accuracy it was shut down for one hour of daily maintenance, and calibrated twice weekly.<sup>471</sup> As has already been shown, this precision allowed the TPQ-10 to control attacks on targets as close as 35 meters from friendly positions. The accuracy deficiencies of the MSQ-77 are perhaps best summed up by an Air Force major who was one of the few from his service to spend any time at all at Khe Sahn, as a liaison officer. His conclusion was that close-in air strikes would have been impossible in bad weather (which persisted for much of February) without the TPQ-10.<sup>472</sup>

The use of the MSQ-77 in its specific application at Khe Sanh was subject to additional limitations which further decreased its effectiveness compared to the TPQ-10. Both systems tracked aircraft with radial coordinate systems, the accuracy of which declined as range from the radar increased. The closest MSQ-77 site was 27 miles away from Khe Sanh, at Dong Ha, while the Marines moved their TPQ-10 to KSCB itself to maximize its accuracy and responsiveness. In terms of the latter aspect, this also gave the TPQ-10 significant advantages. The TPQ-10 was located adjacent to the FSCC bunker at Khe Sanh, allowing targets to be rapidly changed in reaction to changing defensive priorities. Requests and direction passed to the Dong Ha Skyspot, however, had to negotiate the interface between two command and control systems (Marine and Air Force).

Since most of the Arc Light missions were also MSQ-77 controlled, the limited responsiveness of the B-52, whose targets could not be changed less than three hours before the attack even with rapid approval from Saigon, further reduced the Skyspot's responsiveness.

During the defense of Khe Sanh, the Skyspot was troubled by other problems. Its remote location made it difficult to rapidly manage unforeseen airspace conflicts. The Combat Skyspot was only capable of handling one flight at a time, which meant that the operator was unable to monitor other aircraft which might be flying near the aircraft under control. With such a tenuous link to the other control agencies at Khe Sanh, MSQ-77 operators were also denied the instantaneous face-to-face communications that co-location at Khe Sanh would have enabled. These shortcomings resulted in conflicts between tactical aircraft and B-52s.<sup>473</sup> For a system which had so many limitations, the Combat Skyspot operators at Dong Ha apparently had their hands in too many pies, controlling attack aircraft, multi-role fighters, and B-52s. At times they had so many more aircraft waiting for direction than the system could handle that some aircraft ran low on fuel and had to jettison their bombs without ever attacking the enemy.<sup>474</sup> In the high intensity battle of Khe Sanh, perhaps it would have been better if the less accurate and less responsive MSQ-77 was paired solely with the less responsive and less discriminating firepower of the B-52.

## Conclusions

Ground-based air support radar systems provided the Marines of Khe Sanh with an all-weather, day or night, and long-range capability for directing air attacks on almost any target detected. This capability was instrumental in improving the flexibility of employing forces both in the deep and close air battles at Khe Sanh. The TPQ-10, however, was a more accurate and more

responsive system which had been developed and proven well in advance of the battle of Khe Sanh. This system was a product of the close alliance between air and ground power in Marine doctrine and practice, and a proactive effort to maximize CAS effectiveness before the war in

Vietnam. The Air Force MSQ-77 Combat Skyspot, in contrast, was a reaction to unforeseen shortcomings in Southeast Asia which was inspired by the Marine system, but which still lacked the accuracy and responsiveness of a Marine ASRT equipped with the TPQ-10.



# CLOSE AIR SUPPORT

While the tactical jet aircraft that provided the true close air support for Khe Sanh could not match the bulk firepower of the B-52s, they were decisive contributors to the defense. For every B-52 that arrived over Khe Sanh, 10 tactical aircraft were also on hand to provide support.<sup>475</sup> The cumulative effect of the ordnance they delivered was less than that of Arc Light missions, but these 22,000 sorties filled a significant gap left by the air support of the B-52 because the tactical aircraft engaged in CAS were more responsive, flexible, and precise. They could be used not only to attack NVA at very close ranges to friendly troops, but also to conduct attacks on fleeting targets and in other dynamic situations that supported the Marines' ground campaign for the defense of Khe Sanh.

## Visual CAS

While some of the bombing missions flown by B-52s and radar-guided tactical aircraft were in relatively close proximity to friendlies, and were integrated into the defensive "scheme of maneuver" at Khe Sanh, they seldom qualified as CAS in its traditional, and most effective form. This was the delivery of ordnance on targets which have been visually acquired by the attack aircraft, or visually marked for the attack aircraft by a forward air controller (FAC). The common characteristic of these attacks, regardless of what the pilot could or could not see, was that they were conducted under the control of a FAC. The advantages of this technique are numerous. First of all, under visual CAS, the pilot of the attacking aircraft was in direct communication with the ground unit he was supporting. Unlike the other systems of air support, which relied on the passage of target information through extensive command and control systems, visual CAS allowed final coordination based on battlefield events as they occurred. Even a moving target could be attacked if it could be identified to the pilot. There was no more responsive way to direct aircraft attacks, since the

fire support was coordinated and directed at the lowest level—between the aircrew and the actual maneuver unit being supported. The B-52, even when described as a CAS weapon, was on the opposite end of the spectrum, primarily due to its extensive targeting bureaucracy. While under exceptional circumstances, like the detection of a large enemy unit by theater-level intelligence assets, the B-52 could be retargeted in just a few hours, this was indeed the exception. The units which directly engaged the enemy did not enjoy this level of responsiveness. The FAC on Hill 881S, for example, was permitted to submit up to eight targets each day for destruction by B-52s. He received no response from the fire support coordination system or air control system indicating whether or not he would receive the requested support, and simply had to wait for the next day, when the entire region around the target would either erupt in a wall of explosions without warning, or remain completely untouched.<sup>476</sup> When this FAC had a target of any importance, he could not afford to wait for the next day to see if it would be hit or not, so he had to depend either on radar-directed CAS attacks, or if the target was fleeting, upon visual CAS missions under his own control.

In addition to the obvious benefits conveyed by the immediate responsiveness of visual CAS missions, in combination with the larger volume of tactical aircraft sorties providing more complete coverage, this characteristic made it impossible for the NVA to predict and avoid tactical air attacks, as they did with the B-52. The accessibility and responsiveness of tactical CAS aircraft were not the only reasons they were preferred by maneuver units. A final advantage of conducting final coordination at the lowest level was that this mode of support was the most accurate. It could be tainted by no other errors than the skill of the aircrew and FAC, the aircraft's bombing accuracy, and the tactical manner in which they were employed. Significantly, each service's approach to

close air support had an impact on each of these factors, producing a wide variation in results.

The tactical aircraft that supported the 26th Marines in visual CAS missions came from all three services. While this complicates a comparative study by making it difficult to assess their individual contributions, it does provide an opportunity to examine the relative performances of the various services engaged in the same task, side by side. Before going on to a qualitative comparison, however, the quantitative data should be addressed. Unfortunately, no comprehensive summary of solely visual CAS missions has been found, and the manner in which aircraft of the various services were put to use in the mixed missions around Khe Sanh makes it unlikely that such data exists or could be extrapolated from existing data. As a starting point, however, the contributions of all three services in terms of sorties and tonnage dropped is available.

As can be seen in Table 3, Marine tactical aircraft contributed a smaller portion of the total tactical sorties than the Air Force, but delivered a higher proportion of the ordnance. The Marines were able to deliver more ordnance with fewer sorties for several reasons. To begin with, they had heavy attack aircraft, like the A-6A, which could carry more ordnance than the Air Force F-100s or F-4s that composed the majority of their strike aircraft. Second, 1st MAW's bases were all located nearby in the ICTZ, allowing the Marines to carry more ordnance because they did not

need to carry as much fuel on these shorter range missions. In addition, a significant number of Air Force tactical missions were not even intended for Khe Sanh in the first place. Only 30 percent of the Air Force effort at the time was devoted to the direct support of ground troops,<sup>477</sup> but diversions from other missions often increased this number. In January 1968, the Navy and Air Force were using tactical aircraft to try and isolate Haiphong in North Vietnam by severing the transportation lines that lead inland from the port. During this campaign, the weather was very poor, becoming prohibitively so in February. Navy and Air Force aircraft unable to bomb their primary targets in North Vietnam were diverted to assist with the massing of air power in Operation Niagara. In February, Task Force 77 diverted 77 percent of its strike sorties from North Vietnam, followed by another 67 percent in March.<sup>478</sup> Despite the high number of FACs and targets around Khe Sanh, the Air Force and Marine systems had a hard time managing the extra sorties that materialized on a daily basis without warning. Bernard Nalty specified that Navy aircraft were sometimes forced to jettison their ordnance and return home when they ran low on fuel,<sup>479</sup> but the Air Force experienced the same problem.

#### Trends in the Use of CAS During the Siege: A Free-For-All?

The narrative discussion of the Hill Fights, siege, and relief of Khe Sanh has already shown that close air support was an integral and vital

*Table 3. Total sortie and ordnance contributions to the defense of Khe Sanh, from Prados and Stubbe, Valley of Decision, 297.*

	Sorties	Sortie Percentage	Bomb Tonnage	Ordnance Percentage
1st Marine Air Wing	7,078	28.7%	17,015	17.2%
Navy Aircraft	5,337	21.6%	7,941	8.0%
7th Air Force Tactical Aircraft	9,691	39.3%	14,223	14.4%
B-52s	2,548	10.3%	59,542	60.3%

part of Marine operations. During the Hill Fights and the prelude to the siege, for example, CAS was used as a readily available fire support asset for maneuver units once they located and established contact with the enemy. No one, however, has identified the largest patterns to which close air support was put in the defense of the combat base and its outposts, despite the fact that so many authors have written about the siege. It is easy to overlook the big picture when confronted with the apparent chaos of daylight operations, described by the 26th Marines' Target Information Officer (TIO) as

a vulgar free-for-all, with air and artillery under the control of local forward observers and tactical air controllers, who attacked anything and everything that looked peculiar. Targets were taken under fire as they appeared. Repeated checkfires [cease fires for safety reasons], caused by the presence of resupply aircraft and helicopters, prevented a systematic approach to target reduction.<sup>480</sup>

In the nighttime, when darkness prevented visual observations and visually-directed CAS missions, the TIO was able to bring B-52s, TPQ-10 missions, and artillery fires together in carefully orchestrated packages to maximize the firepower directed at a relatively limited number of high priority targets. In the daytime, on the other hand, visual observations produced a high number of "targets of opportunity" which were dealt with as quickly as possible by the individual supporting arms in their most responsive modes. This responsiveness was maximized by engaging each target separately, eliminating the coordination time required by integration with other fire support assets.<sup>481</sup> This "free-for-all," which proved so disturbing to the Target Information Officer who was responsible for developing a whole picture of the enemy so that air power could be applied systematically, was in fact a very effective

decentralized method of employing air power. The very fact that FACs and FAC(A)s were finding valuable targets that the TIO had not been aware of added a new dimension to the air battle by allowing the Marines to rapidly use responsive CAS to destroy targets that would otherwise have gone unharmed. Compared to Captain Baig's targeting of B-52s, this decentralized battle certainly must have seemed chaotic because it was the units that were in contact with the enemy, not an intelligence officer in a bunker far underground, who were identifying the targets. If the TIO and other members of the FSCC had attempted to more carefully orchestrate supporting arms against these fleeting targets, they could not have successfully engaged so large a number. Furthermore, it was misleading for Baig to call the effort a free for all, since the FACs and FAC(A)s had to coordinate requests for air support through the DASC, which acted according to the FSCC's targeting priorities. No attacks could be made in the three zones closest to KSCB without the consent of the FSCC. Even if a FAC(A) found a promising target outside these zones, he still had to work through ABCCC to get strike aircraft to prosecute that target. ABCCC was supposed to be in contact with the 26th Marines FSCC it was supporting, and certainly had to coordinate with the Marines any time it wanted to divert a significant number of sorties destined for Khe Sanh to more promising targets in the outer zones. In summary, the FSCC was managing this decentralized battle by exercising oversight over what targets were permitted to be attacked, and what air assets were devoted to their destruction.

An examination of the week-by-week uses to which CAS was put also shows that the defensive use of CAS was by no means an unmanaged effort. Instead, over the course of the battle, the FSCC modulated the locations and targets on which it concentrated CAS. Early in the campaign, the enemy launched his largest assaults at night. CAS was sometimes used to break up

the remnants of these attacks that remained at daybreak, but on the whole aircraft were kept looking for targets in the immediate vicinity of KSCB. While FAC(A)s were controlling fixed-wing strikes every 5-10 minutes near Khe Sanh during daylight hours, I/3/26 was reporting the presence of large caliber NVA artillery firing at KSCB over Hill 881S. These reports were not considered credible by the 26th Marines intelligence section, so CAS and aerial observation missions by FAC(A)'s remained concentrated around KSCB for the first two or three weeks.<sup>482</sup> When I/3/26 did find targets of opportunity near the hill outposts, it didn't even have a radio to direct air support, and had to call for the services of a FAC(A) who had been working closer to the combat base.

On 7 February, the sudden NVA attack on Lang Vei made that outpost the highest priority for CAS support. Once the Special Forces camp was overrun, the tanks that had attacked there remained a threat to KSCB itself. The 26th Marines reacted by devoting a portion of their sorties to finding and destroying this threat. The anti-armor effort quickly paid off when the NVA tank company was destroyed in less than 10 days. With the armor threat to KSCB eliminated, the Marines were free to reconcentrate their CAS first on NVA troop buildups, then on the artillery, rockets, and mortars that were causing the base so much distress on a daily basis. After more than two weeks of continued bombardment, the FSCC changed its priorities. As the enemy effort intensified, Hill 881S was recognized as a vital outpost not only because it prevented the NVA from setting up anti-aircraft guns directly on the aircraft approach corridors into KSCB, but also because it provided early warning for long-range artillery passing overhead on its way to the combat base. Its location eight kilometers from Khe Sanh along the combat base's long axis also put the hill in the heart of the region where the NVA wanted to set up their rocket launchers. Once the Marines on

881S found a number of rocket positions within two kilometers of the outpost, a radio was sent out for the terminal control of CAS in early February. After that, the Marines of I/3/26 found that the targets of opportunity they located were never turned down, and the company employed over 300 air strikes without the aid of a FAC(A).<sup>483</sup>

The day of peak bombardment was 23 February, and as time wore on, what Marines described as "A-number one" air support was given the credit for earning some breaks from the bombardment up to 48 hours long.<sup>484</sup> Even as the FSCC began to focus on defeating the enemy's artillery, however, an NVA trench complex was detected approaching KSCB. General Westmoreland himself, worried by the precedent established by the NVA siege trenches at Dien Bien Phu, ordered that CAS be concentrated on this immediate threat. The 26th Marines FSCC needed no urging, and had already begun to concentrate CAS on the new trenches threatening from just a few hundred meters away. Once the NVA abandoned their attempt to invest KSCB and Operation Pegasus was initiated in March, the Marines devoted the bulk of their CAS assets to the westward movement of the relief force. Each of these changes in the focus of the CAS effort at Khe Sanh shows that while CAS was executed through decentralized targeting, this effort was deliberately managed by the FSCC according to its changing operational priorities.

### Forward Air Controllers

The lynchpin that connected air and ground power in close air support was the Forward Air Controller (FAC). This was the individual who submitted requests for air support once suitable targets had been identified, integrated the use of that air support into the ground unit's scheme of maneuver, assisted the air crew in locating the targets they needed to hit, and provided terminal control for the safe and effective engagement of

those targets. There were two general types of FACs employed at Khe Sanh. The first type was the ground FACs, who were co-located with the units they supported on the ground. The second type was the forward air controllers who flew above the battlefield directing attack aircraft, which will collectively be referred to as Forward Air Controllers (Airborne), or FAC(A)s. This group included controllers of various sources, including Air Force Airborne FACs (AFACs), Marine Aerial Observers (AOs), Marine Tactical Air Controllers (TACs), and true Marine airborne FACs. Significantly, while Bernard Nalty described the important contribution of these controllers, he overlooked the role of ground FAC's in his Air Force-oriented analysis of Khe Sanh.

It has already been shown that the Air Force de-

*A typical Tactical Air Control Party assigned to a Marine battalion, which was usually broken up into several smaller teams supporting the rifle companies in contact with the enemy. The TACP consisted of roughly a dozen radiomen, and was ideally led by several aviators who had been trained as Forward Air Controllers. In reality, combat casualties and a shortage of aviators meant that the radiomen often had to serve as FACs, sometimes with little or no formal training for the task. Despite that problem, many performed admirably under the harshest combat conditions.*

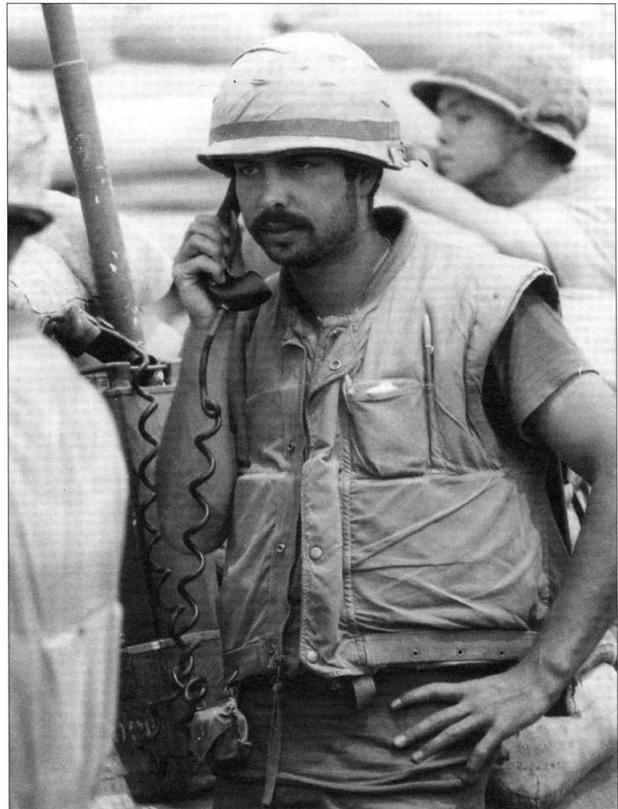


veloped the FAC(A) as its primary control agent for directing attack aircraft in CAS and DAS missions alike, the Marine Corps started with FACs on the ground, and later added FAC(A)s as an extension of the ground Tactical Air Control Parties. The reason for this was that in the Marine Corps the FAC was not considered merely a more accurate set of eyes to find targets for aircraft. Instead, a FAC was the primary agent for coordinating the synergistic combination of air and ground power to accomplish objectives on the ground. It therefore made the most sense to position the FAC on the ground where he could be in close communication with the supported unit commander, and develop an awareness of that unit's situation and priorities. He was then able to advise that commander and plan the integration of air power in the ground scheme of maneuver, and communicate the essential elements to the CAS aircraft, culminating in an attack under the FACs terminal control. Ideally, FACs were aviation officers temporarily assigned to duty with ground units, but combat casualties and an inability to provide enough FACs to serve with every company, platoon, and patrol out in the field meant that well-trained ground Marines often had to do the job. In cases where a fully-qualified FAC was injured, one of his radio operators would step forward, and often proved quite capable. On Hill 881S, for example, the FAC was wounded and evacuated during the first days of the siege. Since his radio operator, Corporal Robert J. Arrotta, did such a fine job, the company commander never asked for a replacement.<sup>485</sup> Ground FACs were especially critical because tactical aircraft engaged in CAS could not carry the immense bomb loads of B-52s, nor could such an indiscriminate weapon be employed in close proximity to friendly troops. For both reasons, tactical aircraft engaged in CAS had to be very precise in the delivery of their ordnance. This was a problem against carefully camouflaged positions, some of which could not even be seen by slow and low-flying FAC(A)s in O-1s. A ground FAC was able to see any target that

could be identified as a threat by the ground unit he supported, and mark it for attack by aircraft with highly visible cues like white smoke rounds fired by artillery and mortars, and even rounds fired from recoilless rifles. Without FACs on the ground, the Air Force was completely dependant on Marine FACs to locate and mark such targets for destruction. Even when FAC(A)s were used to support ground units, the ground FAC remained a vital link for integrating the attacks with ground operations by serving as the FAC(A)s main conduit to the supported unit.<sup>486</sup>

At Khe Sanh, FAC(A)s generally came from a detachment of Headquarters and Maintenance Squadron-16 at Quang Tri, or the Air Force's 20th Tactical Air Support Squadron at Da Nang. These FAC(A)s flew O-1 Bird Dogs, and were augmented by FAC(A)s in UH-1s from Marine Observation Squadron-6 at Quang Tri airfield. At least five FAC(A)s roamed the skies over Khe Sanh during daylight hours, either assisting ground units or independently searching for targets.<sup>487</sup> This ultimately translated to about 30 of them working the area on a daily basis, for a total of almost 1,600 FAC(A) sorties over the course of the campaign.<sup>488</sup> Earlier in the battle some of these light observation aircraft were based at Khe Sanh itself to maximize their responsiveness, and to minimize the fuel and flight time wasted in transit to and from the coastal bases. Although these FAC(A)s had the added benefit of face-to-face communication with the ground units at Khe Sanh, the regular bombardment of the airstrip prohibited a continuation of such operations.<sup>489</sup>

FAC(A)s could locate targets and control tactical aircraft to attack them independent of maneuver units, but their primary purpose in Marine operations was to control CAS attacks which were truly integrated into the fire and movement of friendly units. To do so, they would contact the unit they were supporting by radio, find out what that unit's mission, objectives, priorities, and loca-



*Corporal Robert J. Arrotta of I Company, 3d Battalion, 26th Marines, dubbed "The Mightiest Corporal in the Marine Corps" by his company commander on Hill 881S. Corporal Arrotta had been in Vietnam almost a year when the battle for Khe Sanh began, and had learned the skills of a Forward Air Controller through on-the-job training in combat, including at Con Thien the previous spring. When the officer FAC was wounded on his first day on Hill 881S, Corporal Arrotta took over, and was so good at his job that the company commander never asked for a replacement. Corporal Arrotta controlled several hundred air strikes from this critical outpost over the more than two months he spent there.*

tion were. Often working through a ground FAC, the FAC(A) would then assist with acquiring targets that could not be seen from the ground, such as NVA hidden on the reverse slopes of hills.<sup>490</sup> The FAC(A) could then facilitate the request and routing of CAS aircraft, and control them in these attacks. One example of this occurred near Hill

881S, where an observer was posted as part of the effort to locate and destroy the NVA artillery just across the Laotian border. After several weeks of searching with heavy binoculars, he located the NVA artillery by spotting the muzzle flashes on a hillside more than six miles away. The artillery was much too far away for the FAC on Hill 881S to see attacking aircraft or provide proper control, so the company contacted a FAC(A) who was in the area. The target was described to the FAC(A), who began controlling the delivery of ordnance in the general vicinity of the earlier spotting. After the first attack he received a correction from the observer on 881S to get the strikes closer to the observed enemy positions, and the second attack uncovered a hidden artillery emplacement. Once that occurred, the FAC(A) was able to control numerous flights of CAS aircraft in the area to destroy the hidden guns.<sup>491</sup> The Marines on Hill 881S could no longer see what was going on, but this FAC(A) was obviously conducting attacks under their guidance according to their tactical priorities.

It was critical for FAC(A)s to be familiar with the area in which they were working and the units operating there if they were to have enough situational awareness to destroy the enemy without endangering friendly troops. The Marine Corps recognized this need for familiarity, and assigned its FAC(A)s to work in specific areas on a regular basis. There were two primary FAC(A)s, for example, who supported I/3/26 on Hill 881. According to Captain Dabney, he regularly worked with Tom O'Toole operating under the call sign "Southern Oscar," and Bob Happy, known as "Southern Hotel."<sup>492</sup> Both of these men came from the same squadron, allowing them to share information on the latest tactical situation between flights. The fact that the company commander leading the Marines on Hill 881S knew them on a first-name basis is a testament to the teamwork and close relationships inherent in the Marine air-ground team.

The Air Force's FAC(A)s were equipped much the same as the Marine FAC(A)s, although there was no distinction about what portion of the battle they were truly meant to fight. Like the Marines, Air Force FAC(A)s ranged as far as Laos searching for targets and controlling missions, but they sometimes controlled missions right outside of friendly lines. Although the Air Force FACs were often not trained to call in artillery and mortar missions, as a pragmatic matter of survival they had to learn how to deconflict aircraft attacks from these fires, most often by demanding that they cease when air operations were in progress. This required the monitoring of radios, and the development of a good deal of situational awareness when working close to active ground operations. At times, the experience gained in this process paid off. On 8 February 1968, for example, an Air Force FAC(A) was monitoring an artillery mission being coordinated on enemy troops moving toward Lang Vei. Although only enemy forces were expected to be moving toward the hamlet after the Americans had lost Lang Vei, he acted on a hunch and sought permission to investigate before the mission was fired, and discovered that the target had been misidentified. He radioed back to the Marines that the target was actually a column of refugees, thereby saving them from destruction.<sup>493</sup>

Regardless of where the FAC(A)s came from and what their purpose was, Nalty is correct in his assertion that they were essential to the successful defense of Khe Sanh.<sup>494</sup> This is because the conduct of visual CAS procedures under the control of ground-based and airborne FACs provided a responsive, accurate, and lethal capability to bridge a gap left by strategic bombers and radar-controlled missions. It has already been shown that the NVA sought to move as close as possible to the Marine positions to take advantage of the safety restrictions imposed on B-52 and other radar-controlled air missions. The fact that they were doing so was dramatically il-



*Two Marines of C Battery, 1st Battalion, 13th Marines, stand near the breech of a 105mm howitzer. It appears that they have just fired a white smoke round to mark a target close to the combat base perimeter for attack by aircraft. The dark spot at the top of the picture may be the CAS aircraft, just after releasing its ordnance.*

illustrated by the discovery of NVA trenches approaching the perimeter of KSCB in the last days of February. Westmoreland himself grew anxious about the indications, and told General Momyer, "It is imperative that any opportunity be taken of weather breaks to obtain FAC coverage and directed...strikes against these [emphasis added]." MACV's Deputy for Air Operations was told to plan a "concentration of maximum controllable tactical air into the area immediately surrounding Khe Sanh."<sup>495</sup> It is unclear whether this decision was a defensive move to stop the NVA who had eluded the bombs of the B-52s, or an offensive move designed to use air power to capitalize on the newly-found concentrations of NVA close to the Marines' lines. Either way, the statement was an open admission by Westmoreland that the favored B-52 was unsuitable for conducting this dangerously close portion of his fight.

### CAS Tactics at Khe Sanh

While controlling aircraft in their attacks on

targets in close proximity to ground troops, the Marines had developed a set of procedures familiar to both their ground forces and the aviators who supported them. Upon approaching Khe Sanh, aircraft would contact the FAC to get an update on the tactical situation and receive instructions on how to find the target area. The FAC would issue those instructions by describing the desired holding position using a direction and distance from the TACAN radio navigation station at KSCB. The aircraft would then proceed to that location and orbit in a manner which allowed the aircrew to see the target area described by the FAC. If directed by a FAC(A) they would wait for a rocket or smoke grenade to be delivered near the target, get instructions on the location of the target relative to that mark, and attack, waiting for the FAC(A)s "cleared hot" before dropping their ordnance. With ground FAC's the procedure was more complicated. The ground FAC would arrange for a white phosphorus smoke round, typically fired by artillery or a mortar, to mark the tar-

get. This required some measure of trust on the part of the aviators, since these marking rounds were often fired through the altitudes where they were orbiting. Safety was usually assured by lateral deconfliction, in which the aircraft was directed to orbit on one side or the other of the marking round trajectory. Once the mark appeared and the FAC radioed a correction to the pilot, the actual attack would begin, and the pilot would get clearance to drop only when he was pointed at the target. This final authorization to drop was a vital responsibility of the FAC, since it assured not only that the bombs would impact close to that target, but also that they would not endanger any friendly troops.

On Hill 881S, these procedures were refined to allow the aircraft to attack the target immediately after the smoke round impacted near the target. Aircraft orbited in an oblong pattern over the outpost, and a mark was fired as the aircraft turned back toward the target, so that the marking round would fly in front of the aircraft and impact just as the pilot began his dive to attack. This technique took skill, and even though the Marines put a safety observer on each mortar tube to stop it from firing if an aircraft was in danger of being hit, they found that the process was just too complicated to earn pilots' confidence.<sup>496</sup> To enable the aircraft to continue using the responsive overhead pattern, the infantry Marines switched to direct fire weapons to mark the target. Using equipment like the 3.5-inch rocket, 106mm recoilless rifle, or 105mm howitzer fired directly at the target, produced a smaller, less-easily distinguished grey explosion, but the projectiles did not conflict with the aircraft's flight path. Aircrew, however, remained apprehensive about the risk. As the company commander on Hill 881S said, "it took some convincing for the Marine pilots, and some outright arguments for the Navy pilots. The Air Force pilots would often fly away as soon as they saw an HE [High Explosive] or WP [white phosphorus] impact beneath them, and we rarely

could convince them they were in no danger."<sup>497</sup> He went on to relate one instance in which an angry Air Force pilot claimed that he was endangered by artillery, when in fact the Marines were marking with a recoilless rifle. Dabney explained, "We told him so, but apparently he didn't know what a recoilless rifle was."<sup>498</sup>

It can be seen then, that in an effort to maximize the effectiveness of CAS support, the Marines at Khe Sanh innovated techniques to improve those that had been developed and practiced before the battle. The Marine aviators proved more flexible in executing these procedures because of they had a basic understanding of the ground commander's equipment, and because of the mutual trust that existed between Marines on the ground and in the air. These were both by-products of a service which preached and practiced cooperation between air and ground forces, in direct contrast to the Air Force, which was tentative about applying its air power in support of ground operations.

### The Super Gaggle: Innovation in Marine CAS

The innovative nature of the Marine air-ground

*A UH-34 Seaborse from Marine Medium Helicopter Squadron-163 that crash-landed just outside the perimeter on Hill 881S. The helicopter's tail section broke off, and it was abandoned there for the duration of the 1968 battle, a constant reminder of the lethality of NVA antiaircraft fire.*





*A TA-4F Skyhawk of Marine Aircraft Group-11 lands at Da Nang Air Base. As a Tactical Air Controller (Airborne), the two-seat Skyhawk was used to coordinate the activities of large strike packages, including the "Super Gaggles" needed to resupply the Marines on Hill 881S.*

team was manifest in other unique procedures. Even though the tactical situation at Khe Sanh was relatively static, Marine aviators' experience with true close air support—integrating air attacks with the fire and movement of friendly forces—still paid off. One of the most dramatic examples was the "Super Gaggle." This technique was developed in response to the increasing anti-air threat around Khe Sanh over the course of the siege. From the start, the NVA had used anti-aircraft guns and heavy machine guns to try and shoot down resupply aircraft landing at KSCB, and helicopters moving supplies to the outposts. Even when the aircraft survived the descending approach to the landing zone, they were almost always hit by mortar fire once on the ground, and they were subjected to additional machine gun fire as they lifted off again. For this reason, anti-aircraft weapons identified around Khe Sanh were prime targets when they could be identified by ground observers or by FAC(A)s. In February, the NVA took advantage of the concealment offered by the poor crachin weather to set up more automatic weapons around the base and its outposts.<sup>499</sup> When the weather broke enough to allow helicopter resupply missions of Hill 881S, almost every attempt resulted in some casual-

ties.<sup>500</sup> By mid-February, the situation reached its worst point. When three helicopters were shot down in a single day, the Marine leadership decided something innovative had to be done.

It is not clear who came up with the idea, since several senior officers, including General Cushman himself, claimed credit for the concept. The technique was formally published in 1st MAW Op Plan 3-68. Informally it came to be known as the "Super-Gaggle," suggesting a beefed-up version of a large formation of helicopters, known as a "gaggle" in Marine slang. The plan was designed to use aviation assets to put a protective wall of smoke, fire, and flying steel around the helicopters as they conducted their resupply missions to Khe Sanh's outposts. The first mission was flown on 24 February, and with its success the technique became a regularly scheduled package of aircraft which could be summoned by the Khe Sanh DASC whenever a break in the weather was forecast.<sup>501</sup>

In the typical Super Gaggle, a flight of two FAC(A)-qualified TA-4s would take off from Da

*Corporal Robert J. Arrotta, the FAC on Hill 881S, coordinates with aircraft. While the "Super Gaggle" was a flexible package under the control of a TAC(A), and therefore could have been used on any hilltop outpost, the first step for the TAC(A) was to coordinate with the ground unit being supported, and the FAC was the primary agent of that communication.*





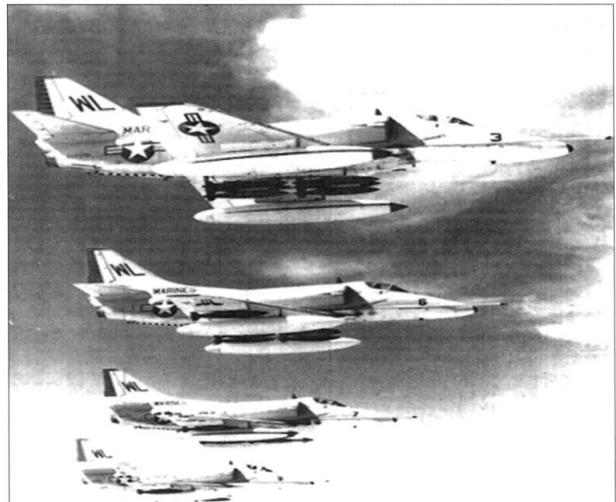
*A KC-130 Hercules of Marine Refueler/Transport Squadron-152 provides in-flight refueling to two A-4 Skyhawks of Marine Attack Squadron-311. The Super Gaggle was a very complex evolution, integrating large numbers of both fixed-wing aircraft and helicopters with ground fires, often under tenuous weather conditions. Dedicated additional support like in-flight refueling was a costly use of resources, but it ensured that the package was flexible enough to be successful for the Marines who depended on it.*

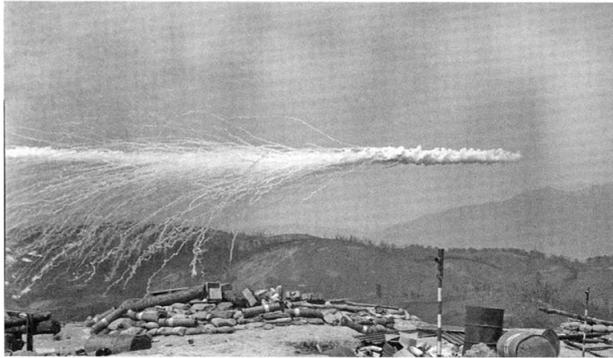
Nang and conduct a reconnaissance of the objective area to determine if the weather was indeed good enough to allow a resupply attempt. If it was, the FAC(A) would direct the DASC to launch of the rest of the package, and would remain on station as the mission commander to coordinate the effort. The helicopter formations took off next, since they flew slower, and had to stop at Dong Ha to pick up their loads,<sup>502</sup> therefore taking longer to reach Khe Sanh. Finally, the remaining jet aircraft took off, so that all aircraft arrived at a rendezvous point near Khe Sanh more or less simultaneously. Once the entire package was checked in and ready to go, the FAC(A) mission commander began by directing a flight of two A-4s in attacking known and suspected anti-aircraft guns along the helicopters' approach path, while two more A-4s laid down smoke screens on either side of the helicopter approach corridor. As the helos entered the corridor and made their approach, the A-4s would continue to strafe on ei-

ther side of the corridor to keep the heads of enemy gunners down, and delivered napalm around the perimeter of the outpost to be resupplied. The final approach of the helos was covered not only by the A-4s, which were ready to react to any unforeseen threats, but by also a renewed smoke screen and UH-1 gunships which could provide more immediate fire support around the landing zone. The withdrawal of the resupply helicopters was accompanied by similar smoke screens and suppressive fires. A small group of helicopters was incorporated into the package for immediate combat rescue operations in case any of the other aircraft was shot down, allowing the downed aircrew and passengers to be recovered before the enemy had time to capitalize on the shoot-down. Each package also contained KC-130 tankers for in-flight refueling, increasing the endurance and flexibility of the jet aircraft supporting the package.<sup>503</sup>

The Super Gaggle was enormously effective.

*A division of four A-4 Skyhawks from Marine Attack Squadron-311 heads for Khe Sanh. Such a division would provide the heavy firepower for a Super Gaggle, delivering its bombs either on preplanned CAS targets to suppress the enemy anti-aircraft gunners or as on-call CAS, attacking new threats that suddenly developed.*





*A smoke screen deployed from a low-flying aircraft as it begins to blossom and shield the landing zones on Hill 881S from enemy view.*

Once the plan was put in regular practice four times a day, only two CH-46s were lost to enemy fire, and in both cases the recovery aircraft immediately rescued the aircrews. The hit rate on resupply helos was cut in half from 10 per 1,000 sorties to less than five.<sup>504</sup> Captain Dabney on Hill 881S later described it as “a massive, complex, well-rehearsed, gutsy, and magnificent performance and only the Marines could have pulled it off,”<sup>505</sup> adding, “And do you think the Army and the Air Force together could have run a super gaggle?”<sup>506</sup> He later elaborated, “If nothing else, [the Marines] all talked the same lingo! I used Air Force CAS and Army helos on my second tour, and my limited observation of the differences convinced me that they could never have pulled

*A smoke screen as it begins to blossom, hiding the friendly positions from enemy view as seen from a high-flying aircraft.*



it off. Precision comes from discipline, and in my experience, both lacked the necessary discipline.”<sup>507</sup>

Perhaps unknown to Dabney, the Air Force was attempting a similar technique to protect the

*The workhorse of the Super Gaggle, a CH-46D Sea Knight of Marine Medium Helicopter Squadron-364, delivers a sling-load of supplies to Hill 881S.*



transports delivering supplies to KSCB, and were enjoying about as much success as he predicted. When weather permitted, Air Force FACs directed fighters in flak suppression attacks alongside cargo planes making their final approach to the combat base. Ideally, a rendezvous was arranged by ABCCC for the FAC, attack aircraft, and transport aircraft at a higher altitude about 18 miles from Khe Sanh. As the transport descended in its approach, a FAC flew on either side, and fighter aircraft orbited overhead. This enabled the FACs



*A CH46D Sea Knight of Marine Medium Helicopter Squadron-364, known as the Purple Foxes, starts to climb out after dropping its load on Hill 881 South.*

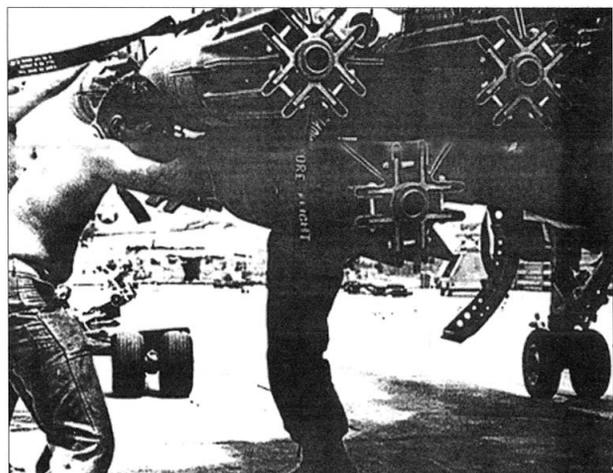
to quickly call the fighters in on any antiaircraft guns which fired and gave their positions away. This ideal, package, however, was rare. Even though by the first week of March the danger of AAA was so great that flak suppression was deemed vital for all transports going into Khe Sanh, 7th Air Force failed to schedule such missions as dedicated, preplanned packages. As a result, many transports decided to brave the flak rather than wait for ABCCC to try to coordinate an ad hoc escort mission from whatever aircraft might be available.<sup>508</sup> This reality contrasts starkly with the priority, care, and forethought 1st MAW put into the Super Gaggle. The technique was published in a Wing operations order, and four full Super Gaggle packages were scheduled on a daily basis, just in case the weather permitted an attempt. The tactic had many supporters among the senior officers of 1st MAW, and squadron commanders personally served as the flight leaders for many of the missions.<sup>509</sup> Clearly, the Marines were unwilling to trust the execution of such a complex and dynamic mission to an ad hoc collection of aircraft hastily scraped together by the DASC from whatever happened to be airborne in the area. The Super Gaggle was likely developed from techniques the Marine air-ground team had already put in practice. The FSCC, for example,

had already been providing suppressive fires timed to cover aircraft approaches to KSCB at the airfield manager's request.<sup>510</sup> Even if this was not the idea that germinated the Super Gaggle, both demonstrate the very effective results that the culture of close air-ground fire support cooperation was yielding.

### Balancing Risk and Accuracy

The Super Gaggle was a superior product of the Marine culture of close air-ground cooperation. Another product of this culture was an increased willingness of aviators and their commanders to

*Ordnancemen ready the 500-pound high-drag bombs hung under the wing of an A-6A Intruder from Marine All-Weather Attack Squadron-242. The "snake-eye" fins on the back of each bomb would open once the bomb was dropped off the aircraft, decelerating the ordnance enough to allow the aircraft to fly out of the fragmentation pattern created when the bomb detonated. Such devices were only necessary when tactics called for low-altitude deliveries. Marine aircraft usually carried these bombs because they got "down in the weeds" where it was easier to pick out the target designated by the FAC. Such attacks were more precise, but exposed the aircrew to greater danger of enemy fire, and required greater deconfliction with other supporting arms, like artillery and mortars. To Marine aviators, the improved performance in support of their fellow Marines on the ground was well worth the extra risk and effort.*





*An F-8E Crusader of Marine All-Weather Fighter Squadron-235 delivers two snake-eye bombs on a target close to one of Khe Sanh's hilltop outposts.*

take risks to improve the support provided to the ground Marines. At times, individual Air Force aviators proved willing to take extreme risks. Two Air Force FAC's, for example, flew beneath a 1,000 to 1,200-foot cloud layer to guide fighters in the final defense of Lang Vei on 7 February 1968, temporarily reversing the course of the battle.<sup>511</sup> Institutionally, however, the 7th Air Force was not tempted by such payoffs to allow its aircrew to take these risks, even though they were routine for the 1st MAW. The Air Force insisted on carrying general purpose bombs which could be dropped from high altitude, rather than napalm or high-drag snake-eye bombs which were delivered in more precise low altitude attacks. The corresponding loss of accuracy meant that point targets, like the bunkers which provided the NVA with protection from other air attacks, could rarely be hit. During General Momyer's only visit to Khe Sanh, the 26th Marines Air Officer told him that the effectiveness of Air Force tactical aircraft were limited because they did not carry the appropriate ordnance. Momyer's response to this Marine concern was bemusement, and a refusal to risk his planes "down in the weeds." He told the Marines to depend on their own aviators for high accuracy high-drag bombing.<sup>512</sup> This attitude is in stark contrast with the can-do approach of Marine aviators, who often flew in valleys below Marine positions like Hill 881S.<sup>513</sup> Since the 7th

Air Force was apparently unwilling to compromise on its tactics, the 26th Marines FSCC subsequently tried to use Air Force aircraft on radar-guided TPQ missions further from friendlies, and saved the Marines, with their more effective CAS ordnance and accurate, low-altitude attacks, for close-in targets.<sup>514</sup>

The Marines occasionally had to pay for the risks they took by flying at such altitudes. One F-4 was sent to destroy a tenacious .51-caliber machine gun that had been shooting at transport aircraft from a position just 200 meters off the end of the combat base's runway. During the attack the NVA gunner engaged the aircraft in a duel and actually shot the Phantom down.<sup>515</sup> The loss of aircraft even in such horribly inefficient exchanges, however, did not persuade the Marines to change their tactics. Apparently, they felt that the value of accurate low-altitude attacks to ground operations justified such losses in the long run.

### Precision

Marine aviation's service-oriented support also produced superior results in the individual performance of its aviators. One area in which superior results were manifest was in precision. Marine aviators were willing and able to attack targets in much closer proximity to friendly positions than their peers in other services. Captain Dabney, who was supported by approximately 300 CAS missions over the course of the siege, stated, "Overall, the Marines were the most accurate." He went on to explain that the Marines were equipped with more appropriate ordnance and more suitable CAS aircraft like the A-4, "but even given these factors, the Marines were the most accurate."<sup>516</sup> Dabney was able to make that statement with confidence because he sometimes saw the other services conduct attacks with identical aircraft. He observed, for example, "the Navy A-4s we got were nowhere near as precise."<sup>517</sup> Based

on his observations of the qualitative difference between the services, Dabney imposed a rule on how close to his Marines he would allow the different pilots to drop ordnance.

We'd give them targets appropriate for their ordnance, with the rule (mine) that any targets closer than 1000 meters were for USMC birds only. The reasons for the rule were several; first, that the Navy/AF ordnance was generally low-drag, which meant they had to fly high to drop it, which meant more chance of error/miss; second, that they were probably not well-trained for CAS, if only because they were flying "up north" missions; third, they were in 'mushy' aircraft like Phantoms and F-101's which can make their bombing passes either too fast or too high for the accuracy we needed to destroy AA in caves and the like; and fourth, they were not Marines. [emphasis added]<sup>518</sup>

Here Dabney acknowledged practical limitations, but also revealed a strong belief in the superior capabilities of Marine aviators. Significantly, Dabney felt that his judgments on the accuracy of Marine CAS were widely shared. As he said,

The Army infantry CO's I've talked to who served in I Corps or northern II Corps in Vietnam, where they could get Marine CAS, always preferred it to Air Force CAS. They knew CAS was central to our combat power, and that TAC [Air Force Tactical Air Command] has always been a poor cousin in the Air Force. The difference was obvious at Khe Sanh, where the grunt's rule was "Marine CAS for danger close, Navy at least one click out, and Air Force in the next country."<sup>519</sup>

Lieutenant Colonel Wayne C. Andersen, who commanded the Marine O-1's detachment at the time of Khe Sanh but also had extensive experience flying with Army and Air Force O-1 and



*An F-4 Phantom drops six "snake-eye" bombs. The aircraft is very low, and the angle at which the photographer was holding the camera indicates that the target was very close to friendly positions.*

O-2 crews, agreed. Of his experiences he summarized,

I do not fault the Navy or Air Force pilots in their capability as their training just didn't provide them the skills to place ordnance or napalm in on targets that needed truly close air support... When it had to be truly tight support I ALWAYS sought out Marine aircraft because I knew they could lay it in tight.... The other services were good at high altitude stuff, and I and my fellow pilots just never felt comfortable laying them in truly close. While I flew with Air Force and Army observers that still was true.<sup>520</sup>

Anecdotal evidence to support these judgments on the matter of precision is plentiful. Each of the most dramatic descriptions of successful close-in attacks on enemy targets which can be traced to a particular service turns out to be the work of Marine aviators. During I/3/26's 20 January 1968 attack on Hill 881N, for example, the close air support of two Marine A-4s was critical to beating off repeated enemy counterattacks. Napalm was dropped 100 meters from the friendlies, so close that the Marines could see the pilots' heads within their cockpits, and several Marines had their eyebrows singed.<sup>521</sup> Just the next morn-

ing, a Marine A-6 was credited with finally breaking the back of an NVA force that had been attacking Lang Vei all night. The Marines dropped all 28 of their 500-pound bombs directly on top of the enemy formation, and the few NVA who survived rapidly melted into the jungle.<sup>522</sup>

In the previous two examples, Marine aviators executed very accurate and effective attacks in support of relatively dynamic ground situations. Even in very static situations, Marines proved more confident in their skills than Air Force aviators. Toward the end of the siege, for example, the Marines suspected that the NVA were attempting to dig tunnels under their defenses. Near Hill 861A, a suspected tunnel was located just 15 or 20 meters from E/2/26's defensive perimeter. This target was particularly risky because it was located between two Marine positions, Hill 861 and its outpost on 861A, leaving it untouchable until the right combination of a Marine forward air controller and four attack pilots from VMFA-232 arrived on the scene.<sup>523</sup> As Prados and Stubbe tell it,

For almost two weeks they begged the forward air controllers to direct fixed-wing strikes at this target. The controllers consistently refused. It happened that virtually all of these cases involved either Air Force controllers or strike aircraft or both, and the Air Force rigidly adhered to the restrictions set on distance from friendly forces at which various sizes of ordnance could be used. Then one day a Marine forward air controller was on station with Marine air coming in and the controller was talking on the radio with Captain Breeding. Told of the seriousness of the tunnel threat, the air controller agreed to buzz the target himself to judge whether it could be safely hit. After that the controller agreed to take on the target, asked Breeding to get his men under cover, and sent in a flight of four fighter-bombers

one by one. There were secondary explosions on the very first pass and before it was over the target was belching yellow smoke and finally blew up with a tremendous explosion.<sup>524</sup>

An even more dramatic example of Marine aviators' willingness to take on difficult and dangerous targets occurred a year earlier in the same area. During the Hill Fights a Marine patrol was ambushed near Hill 861, and the staff sergeant in charge of the patrol called in a Marine F-4 for support. He was forced to hand the radio off to his mortar forward observer, a lance corporal who had never controlled aircraft before. The extreme difficulty of the task, especially when the Marines were in such a dynamic close-contact situation and lacked an experienced FAC, resulted in two aborted attacks. On the third pass, however, the F-4 dropped napalm which impacted just 50 meters away from the patrol, breaking the ambush when the few remaining NVA ran away.<sup>525</sup> The patience of the Marine pilot, motivated by an understanding of the urgent situation and confidence honed by frequent work with ground troops, saved the day.

### Fratricide

Attacks so close to friendly forces came at a cost. At Khe Sanh, dropping bombs closer to friendly lines reduced the NVA sanctuary from air attack and helped win close fights, but it also increased the risk of inadvertently injuring friendly troops. Stories exist of air attacks made so close that shrapnel landed in Marine trenches, apparently without creating injuries,<sup>526</sup> but there were also a number of cases where the defenders were not so lucky to avoid the effects of friendly fires. Here again, the evidence shows a clear difference in the results obtained by the two services. Appendix C delineates the fratricide and near-fratricide incidents which occurred in the Khe Sanh area over the course of the Hill Fights of 1967

and the events surrounding the siege of 1968. Of these 18 cases, 9 cannot be positively traced to one service or another, largely due to the fact several aircraft types were flown by more than one service. Of the remaining six cases attributable to aircrew error, two were caused by Marine helicopters and four were known to involve Air Force aircraft. At first glance, this data shows that of the entire period from May 1967 to May 1968, the Marines were involved in 50 percent fewer fratricide incidents than the Air Force, despite the fact that they provided a much higher percentage of sorties, and despite the fact that the Marines engaged targets in much closer proximity to friendly forces. Of note, the two Marine incidents that occurred took place during the fluid, chaotic Hill Fights, and were helicopter-related accidents that occurred while engaging enemy in dynamic ground combat with the supported Marines. As a comparative measure of effectiveness, it would be more appropriate to rule these out in order to compare only “apples to apples”: Marine fixed-wing aircraft to Air Force fixed-wing aircraft. Although four fratricide incidents can be positively traced to the Air Force, not a single one of the 18 incidents can be tied to aircrew error by Marine fixed-wing pilots. Furthermore, during the static situation that surrounded the NVA siege of 1968, which is the only time that Marine and Air Force performance can be truly considered side-by-side, there was not a single documented case of a Marine fratricide. This was the same period when at least half the Air Force fratricides occurred.

With respect to CAS, the difference between the dynamic tactical situation of 1967 and the static defensive operations of 1968 is important. The fratricide rate increased dramatically in dynamic situations. Fratricides were very rare during the siege itself because the Marines were in static positions whose elaborate trench systems made them easily visible from the air, as seen in Figure 9. Twelve of the 18 fratricide incidents occurred either during the dynamic Hill Fights

of 1967, during the chaotic night when the NVA overran Lang Vei, or during the “break out” from Khe Sanh.

A closer look at the fratricide incidents of the two services is revealing. Two of the four Air Force incidents involve cases where pilots misidentified their targets. In these missions the pilots were operating independently, and were not under the control of a forward air controller. On these deep air missions which did not require FAC(A) control, the pilots failed to properly identify their targets, and wound up dropping their ordnance on villages full of civilians. Their errors were significant. In the first incident, the Air Force pilots attacked the friendly-held hamlet of Lang Vei, thinking they were attacking a target 20 miles across the border in Laos.<sup>527</sup> Although those missions would be more properly classified as DAS, the Air Force was the only service to experience such problems around Khe Sanh, demonstrating the danger of that service’s willingness to apply air power without careful discrimination.

In the two fratricide cases traced to Air Force planes in CAS missions, the aircrew were guilty of overconfidence, and a gross misunderstanding of both CAS procedures and the caution required when attacking targets in close proximity to friendly forces. In the first incident, during an assault on Hill 861 during the Hill Fights, two Marine jets were called in to attack NVA that were interfering with a Marine company’s withdrawal. After bombing and strafing runs by the Marines, an Air Force jet was brought in, but fired its rockets less than 100 meters from the Marines, wounding at least one of them. The Marines apparently perceived the aircraft to be an even greater threat than the NVA, and began firing at it.<sup>528</sup> In the second incident, a group of three Air Force F-100s were directed to hold and wait for control by a FAC working some Marine A-4s close to the perimeter of Hill 881S, which was clearly defined and visible from the air. Observing those

attacks and perhaps mistaking some grass being burned off on another part of the hill for a target, one F-100 pilot commenced his attack without direction from the FAC and without even notifying the FAC of his intentions. The pilot dropped his bombs 50 meters away from the company command post, showering the position with dirt, rocks, shrapnel, and tree stumps. A bunker was caved in and several Marines required medical evacuation. Enraged that the pilot would even attempt to drop in such close proximity without a "cleared hot," the company commander told the F-100's to leave the area or risk being shot down by his Marines. Apparently, he decided that this was the type of support he could do without.<sup>529</sup> In both incidents Air Force aircrews had watched Marine jets attacking targets in close proximity to friendlies and tried to replicate the results, but got in dangerously over their heads. They also lacked an understanding of the absolute authority a FAC had to have when bombs were dropped in close proximity to friendly forces. Of the Air Force's performance in CAS, Dabney stated,

A bird would come wings level oriented on the wrong target, we would not clear hot, and he would drop anyway...I do recall one mission where a bird took fire and his wingman rolled in and dropped on the gun position without our clearance. Air Force mission. We raised hell with the flight leader because the wingman could just as well have rolled in on us, since we were often firing machine guns from the hill during CAS.

The Lesson here is simple. If you are executing a CAS mission, you do NOTHING that is not cleared by the ground FAC/TAC(A) first.<sup>530</sup>

The incidents involving Marine fratricides follow a different pattern. Both of these cases involved helicopters intentionally trying to deliver ordnance in close proximity to friendly forces they had positively identified. In these extreme

situations, friendly and enemy troops were essentially intermixed so that any fire delivered to protect the Marines had a danger of hurting them as well. These two fratricide cases were the unfortunate costs of preventing the Marine positions from being completely overrun.<sup>531</sup> Again, not a single case of fratricide can be traced back to the Marine tactical jet aviators performing visual close air support missions. The reason for that is that the Marines understood the danger implicit in these missions, and were simply too disciplined and careful to drop unless they absolutely knew friendlies would not be hit. When queried about fratricides, the commander of the Marine O-1 detachment stated that even though he had controlled Marine jets attacking targets just 50 meters from defensive perimeters with napalm, "I never received a complaint from being too tight on target."<sup>532</sup> As Captain Dabney put it, they were guilty only of "being too careful."<sup>533</sup>

In summary, statistics show that a higher percentage of fratricide incidents were committed by Air Force pilots. In these cases, pilots most often deliberately conducted attacks on friendlies which had been mistakenly identified as enemy. This did not happen with Marine aviators, whose culture of close coordination and fear of fratricide dictated firing only on targets positively identified as enemy. Marine fratricides tended to be the result of intentional attacks under very exceptional dynamic circumstances when positively identified enemy forces had approached too close to the Marines on the ground, and the situation called for extreme risks to be taken in order to avoid much greater catastrophes.

### Limitations of Close Air Support: Visual Acquisition

The several fratricide incidents at Khe Sanh illustrate the first of a number of limitations of close air support conducted by tactical aircraft in visually guided and visually controlled attacks—

the accuracy and danger of conducting such missions was highly dependant on the skill of the aircrew conducting the attack. Another factor which limited effectiveness was the need to see the target. This was especially important with tactical aircraft because they did not carry the huge volume of munitions that a B-52 could, nor could they drop bombs so indiscriminately in close proximity to friendly lines. As a result, bombs had to be placed very close to the target for the desired effects were to be achieved. The NVA realized this, and as Robert Pisor pointed out, the NVA had "truly perfected the art of camouflaging bunkers and defensive works." In essence, the best way to avoid the hammering of American air power was to avoid detection, and this became their primary defense.<sup>534</sup> The case of two NVA 120mm mortars that harassed Hill 881S throughout the entire siege is illustrative. Crater analysis and limited observations lead the Marines to conclude that the mortars were hidden in a bowl just a mile and a half away. A various times the target area was worked over with hundreds of tons of high explosives, including napalm and 1,000-pound bombs, but the mortars could never be located and silenced.<sup>535</sup>

Hill 861 was also constantly harassed by a sniper ensconced in a cave. This cave was repeatedly bombed, but the sniper always managed to clear away the dirt until a Marine FAC(A) was able to fly an extremely slow approach in the face of NVA fire to shoot a smoke rocket into the cave mouth. Once the target was finally marked accurately, an F-4 made a similar slow approach (with his flaps halfway down, in the landing configuration), and put two 500-pound snake eye bombs inside the cave. The sniper threat was permanently eliminated as a result of that attack.<sup>536</sup>

### Limitations of Close Air Support: Ordnance

Another limitation was the unsuitability of the various types of aviation ordnance for the targets

engaged. The military-industrial complex of the United States developed a wide arsenal of munitions which could be delivered by its aircraft. The various munitions were developed with different purposes in mind. Some munitions, such as cluster bombs, were designed to cover large areas with small fragments of shrapnel in order to destroy enemy troop formations. Other anti-personnel munitions, like napalm, were designed to accomplish a similar purpose with a suffocating and burning effect. Other weapons were developed with the intent of destroying the enemy in well-protected strongpoints, like bunkers and armored vehicles. General-purpose bombs could be used for any of these purposes, depending on how they were fused. Instantaneous fusing would cause the bombs to burst as soon as they hit the ground, devastating unprotected troops with above-ground fragmentation patterns. Putting a delayed fuse on the same bomb would cause it to penetrate the first object it hit before exploding. This was ideal for concentrating their destructive effects inside bunkers and tanks if a direct hit could be achieved.

The wide variation in ordnance types was not, however, instantaneously available to the pilot as he prepared to engage any of the various targets he encountered on the battlefield. Because munitions had to be loaded before takeoff, and could not be changed in flight, there were times when the ordnance carried was not appropriate for the targets encountered during the flight. This proved to be a problem several times during the battle of Khe Sanh. Early in the siege, before the NVA revealed their presence in force, the 26th Marines had requested aircraft to support Khe Sanh by carrying time-delay fused bombs. These were general-purpose bombs which would be dropped along likely avenues of approach, and would sit on the side of the trail for several hours before exploding. This ordnance was being used as part of the blind harassment and interdiction fires, rather than a precisely targeted air effort.

This created a problem on 21 January when the enemy finally revealed himself in force. Major Jim Stanton, a member of the FSCC, was flying an aerial observer mission when he located what he believed to be an NVA regiment in an open area. He assembled eight flights of aircraft, including Air Force, Navy, and Marine planes, but every one of them was equipped with the time-delay bombs. As a result, when the enemy regiment was attacked, the bombs hit the ground and did not explode. It is doubtful that the NVA obligingly waited in the area until the bombs blew up.<sup>537</sup>

After the siege began, the American aviators began carrying antipersonnel cluster bombs to prevent a repetition of such incidents, which worked fine until the NVA attack on Lang Vei on 7 February. During that attack the sudden appearance of a company of PT-76 tanks caught the defenders of Khe Sanh completely off guard since this was the NVA's first use of tanks inside South Vietnam for the entire war. The cluster bombs proved ineffective in stopping the tank attacks, which were decisive in the fall of Lang Vei. In reaction to that event, some tactical aircraft were directed to carry anti-tank rockets to meet the threat when it materialized again.<sup>538</sup> Fortunately, shortly after the fall of Lang Vei, a FAC(A) located eight of the amphibious PT-76's tied up along the bank of a river in Laos. The contact was reported to the 26th Marines FSCC, which wisely identified the tanks as a high priority target and sent a flight of Marine A-4s to attack. Their attack destroyed the tanks as well as an ammunition stockpile which had been camouflaged nearby. Intelligence analysts assessed that the threat presented by enemy armor in the region had been eliminated,<sup>539</sup> freeing the CAS aircraft to switch back to a heavy concentration of antipersonnel ordnance.

In some cases, the targets the Marines wanted destroyed proved impossible to reduce. In discussing the enemy trenching effort that approached KSCB at the end of February 1968,

Bernard Nalty shows that General Westmoreland himself ordered the concentration of tactical aircraft against trenches right outside the Marine perimeter. Nalty goes on to describe some attacks by Navy aviators which collapsed 50 meters of trenchline and killed at least two NVA, noting that "the enemy soon abandoned the building of assault trenches."<sup>540</sup> The reality, however, was that the Marines experienced considerable frustration in trying to apply air power against the NVA trenches. At first, they tried destroying the NVA trenches using rockets, napalm, and high explosive bombs as large as 2,000 pounds in combination with artillery. Despite the fact that fighters and bombers were continually working over the trenches in the daytime, the NVA kept getting closer as the digging continued every night.<sup>541</sup> Next, the Marines applied the innovation that yielded several other effective solutions. Aircraft dropped full fuel tanks on the trenches so the jet fuel would have a chance to fill the trenches, and then lighted it off with rocket or cannon fire in "napalm baths."<sup>542</sup> NVA sources show that each night they had to repair between 40 percent and 70 percent of their siege work,<sup>543</sup> but unfortunately for the Americans, the particularly persistent nature of the NVA ultimately did prevent air power from stopping the approach of the siege trenches. The joint staff even considered aerial deliveries of wet concrete to fill the trenches, but this was far beyond the logistical capabilities of the already-stressed air bridge. Coming to the final conclusion that the siege trenches could not be destroyed by air power, General Cushman decided that the only way to prevent their use against the Marines was to request that C-47 "Spooky" gunships remain overhead to continually cover the trenches with fire.<sup>544</sup> The C-47 gunships had the advantage of much longer loiter times than tactical jets. As long as the threat of anti-aircraft fire to these vulnerable, slow-flying aircraft was reduced (as it had by the later stages of the siege), and the targets could be effectively engaged solely with

gunfire (as personnel in open trenches could), the gunships had good potential. The Marines had already developed a good appreciation for these weapons, and had placed 55-gallon drums filled with a mix of gasoline and diesel fuel just outside their perimeter. The defenders planned to light these drums on fire in case of an enemy assault at night, making it easy for "Spooky" to see the friendly lines. While the expected assault never materialized and made this necessary,<sup>545</sup> the gunships nonetheless proved their worth in countering NVA trenching efforts. Filling in the gap left by fast-moving tactical jets, such gunships had the well-earned respect of Marines in the defense of Khe Sanh.<sup>546</sup>

While the unsuitability of the various types of aviation ordnance could be a distinct limitation for tactical aircraft engaged in close air support, it is important to note that this same limitation was shared by the other air support techniques used at Khe Sanh, such as strategic bomber strikes and radar guided tactical attacks. When a Stratofortress formation laid waste to several square kilometers of distant jungle real estate, for example, little attention was paid to whether or not a particular bunker was destroyed. Tactical aircraft, on the other hand, engaged point targets in locations where the effects of their attacks could be immediately observed. When those effects fell short of the desired destruction, it was readily observable. It is important to remember, therefore, that ordnance limitations were shared by all aircraft to a large degree. It was merely more apparent with tactical aircraft engaged in the precision delivery of smaller ordnance loads.

### The Effectiveness of Massed Close Air Support

Service distinctions and limitations aside, as a whole, the conduct of close air support at Khe Sanh did have a significant effect on the enemy. In addition to the numerous examples already cit-

ed throughout this work, there are some general observations demonstrating the NVA's respect for tactical air. The NVA appreciated and exploited the limitations of the B-52, stating in the 304 Division's official history that once the Americans were "forced" to use B-52s, "Our forces clung to the enemy's barbed wire, and for that reason, the enemy didn't dare attack indiscriminately because many times their bombs and ground fire caused casualties to their own troops. [emphasis added]"<sup>547</sup> While the enemy clearly understood the nature of the B-52 as a blunt force weapon, the NVA also knew that they would find no such sanctuary from tactical air attacks, observing that as they dug trenches right up to the Marine perimeter "There were even [air] strikes into the third [innermost] fence line."<sup>548</sup>

Additionally, because the high-altitude B-52 gave no warning to the NVA,<sup>549</sup> its deterrent effects were less direct than those of tactical aircraft. The NVA learned the presence of a tactical jet meant death for the soldier who exposed himself. On Hill 881S, for example, the Marines found themselves under constant sniping by an NVA recoilless rifle. Every time they brought in some tactical aircraft to destroy this point target, the enemy stopped firing and concealed himself until the aircraft left.<sup>550</sup> Even if the aircraft could not destroy this hidden position, its deterrent effect may have prevented casualties, and at a minimum bought the harried Marines some respite. Another testament to the effectiveness of tactical jets occurred when an NVA soldier decided to surrender to the Marines on 881S. There were no targets being prosecuted at the time the prisoner was on the hilltop being interrogated, so a Marine jet made a low pass over the hill as a gesture of support for the infantrymen. Hearing the approaching aircraft and finding himself exposed in the open, the NVA soldier became so terrified he defecated on himself, standing right in front of the Marines.<sup>551</sup> Clearly, the tactical aviation whose effects the NVA could observe on a daily basis

struck them with a terror not unlike that inspired by the massive B-52 bombardments.

### Conclusions

Visual CAS missions played an unquantifiable, but nonetheless valuable role in the battle for Khe Sanh by complementing the heavy, blunt firepower of the B-52. Bernard Nalty downplays the differences in the various services' contributions to the close air support battle, stating that, "pilots occasionally complained of unfamiliar

procedures used by another service, but this was a minor annoyance that did not hamper air support of the Khe Sanh Marines."<sup>552</sup> This statement, however, overlooks the complications that were experienced, and it does not reflect the different results produced by two services with distinct approaches to close air support. Although Air Force tactical aircraft made great contributions to the close fight, the culture of the Marine air-ground team allowed an innovative and more aggressive employment of CAS with superior results.

# CONCLUSIONS

Prior to the 1968 battle of Khe Sanh, the U.S. Air Force and U.S. Marine Corps were distinct institutions with distinct approaches to close air support. The Air Force was responsible for the application of air power to win wars from the tactical through the strategic levels, but chose to focus on strategic missions in the early Cold War, its formative period as a separate service. As a result, it viewed tactical ground support missions as a distraction from its strategic orientation, and from more vital tactical air missions like air superiority. Close air support became a tertiary capability, which the Air Force chose to maintain only when threatened in interservice turf battles, and even then only with multi-role aircraft which could be put to other uses. When the Vietnam War erupted, the Air Force found itself ill-prepared for low intensity conflict. As the war escalated it was constantly struggling to meet the nation's needs for tactical air support of ground forces in Southeast Asia. The Marine Corps, by comparison, was a distinctly infantry-oriented force which had developed a tactical air arm purely as a tool for supporting ground forces. For this reason, close air support was central to the Marines' conception of how to win wars, and the Corps found itself much better prepared to support ground operations in Vietnam.

When two NVA divisions surrounded the 26th Marine Regiment at the remote outpost of Khe Sanh From January to March 1968, and General Westmoreland initiated Operation Niagara, the Air Force and Marine Corps found themselves united in their operational objectives, even if their reasons for fighting there and the means by which they fought were very different. Many historians of the battle have lauded it as a victory of air power, and they are probably correct to do so. Although the primary NVA objective at Khe Sanh and the casualties they suffered in its pursuit remains unclear, there can be little doubt that General Giap would have been pleased by the fall of Khe Sanh, and that he lost a horrific number of

men in the hills around the combat base. Accepting this, air power, which delivered 96 percent of the ordnance against the NVA for an average of about five tons of bombs for every NVA attacker (by conservative estimates),<sup>553</sup> has to be given the lion's share of the credit. NVA sources confirm the conclusion that the Communist troops feared air power above all else. While historians have therefore been correct to describe the battle as a victory of air power, they have not taken advantage of the opportunity for a comparative analysis of the U.S. Air Force's and Marine Corps' contributions to determine what these two very different institutions brought to the battle.

The Air Force attempted to fight an interdiction battle at Khe Sanh, using a variety of sensors to locate the enemy as the NVA closed in on the bait offered by the Marines at Khe Sanh Combat Base. Once located, they sought to annihilate the NVA by the application of massive air power weapons like the B-52 Stratofortress, applied against targets identified by a highly sophisticated electronic surveillance system. While Arc Lights undoubtedly demoralized the NVA and contributed to the American success at Khe Sanh, it is also clear that participants in the battle were overawed by its destructive potential, and there is little definitive evidence to show that this weapon was the decisive tool for winning the battle. Closer examination in fact reveals that the B-52 was subject to a number of limitations, including very limited responsiveness and an inability to attack targets in close proximity to friendly forces. Rather than applying innovative solutions to such problems, General Momyer placed limitations on the risks to which his aircrews could be exposed, and focused his efforts on using the battle as justification to finally win control of Marine air assets, ultimately producing a diluted version of the single management system which only further slowed the responsiveness of air forces. By failing to critically develop these limitations and errors, historians of the battle have not been moti-

vated to examine the contributions of tactical air forces, which were more responsive and precise than the B-52s. These characteristics are exactly what made such them suitable for the true close air support of ground forces.

In this matter a clear difference between the air support provided by the Marine Corps and Air Force is apparent. The Marine Corps was better equipped for the tactical support of ground forces in Vietnam, with purpose-designed aircraft like the A-4 Skyhawk and A-6 Intruder, and an all-weather bombing capability enabled by the ground-based TPQ-10 radar direction system. The Marine Corps had an air command and control system which was more responsive, and specifically designed to foster close communications between the air ground team which had been carefully prepared according to Marine doctrine for combat deployment to Vietnam. That preparation included training which yielded superior results in terms of the quality of support rendered: it was closer, more accurate, and less deadly to the Marines who depended on it. If Khe Sanh was a victory of air power, then this tactical air power was a vital complement to the heavy firepower at which the Air Force excelled.

This conclusion should not be construed as a postulation that Marine Corps aviation is superior to that of the Air Force. In fact, they were different types of air forces, and as a combined arms team the Marine Corps was merely better suited for the war the nation faced in the jungles of South Vietnam. The Air Force, on the other hand, deserves the lion's share of the credit for the strategic deterrence provided to the nation in the Cold War, a service the Marine Corps was neither suited for nor interested in providing. It is important, however, to recognize that these

two services are today perhaps just as deeply entrenched in their own approaches to close air support as they were during the battle of Khe Sanh. The Marine Corps has been recognized as the Department of Defense's senior agency for the development of close air support doctrine, yet Air Force officers have naturally served as the Joint Force Air Component Commanders (JFACC's) for all joint operations in the recent past. As a result, even as the importance of close air support has increased and deep air missions have decreased in operations like Enduring Freedom in Afghanistan and Iraqi Freedom II, the Air Force is the agency which develops the procedures and control systems for the application of air power. To many Marine participants in such CAS operations, it seems as if the U.S. military is reinventing the wheel every time, only to learn the same lessons. Air force supporters have responded to such criticism by predicting that new, hyper-precise joint service GPS-guided weapons like the Joint Direct Attack Munition have invalidated the need for such intense close air support training and single-minded focus as is advocated by Marine doctrine. This study, however, suggests that even if these predictions are true, there are many other benefits to the Marine approach, like command and control structures which are more responsive, and aviation forces which keep in closer touch with the objectives of ground commanders. If the battle of Khe Sanh is considered a single data point in a longer history of institutional disputes about close air support, it reinforces the idea that setting aside institutional parochialism in war planning to incorporate the strengths of both services will yield superior results, as these air forces complement each other in pursuit of joint objectives.

# APPENDIX A: GLOSSARY OF ACRONYMS AND TERMS

**AI**—Air Interdiction, air attacks with the mission of denying enemy forces the resources to win a battle by attacking those resources or their means of transportation enroute to the battlefield. Interdiction is traditionally viewed as a mission falling between CAS and strategic attacks on enemy industrial resources or morale bases.

**AO**—Aerial observer, an artillery or infantry officer trained for aerial observation who flew in O-1s, OV-10s, and sometimes UH-1s to assist the pilot in forward air control by coordinating with ground combat units.

**ASRT**—Air Support Radar Team, a detachment of Marines who provided terminal guidance to aircraft using a ground based TPQ-10 radar to guide them to the proper release point to drop bombs on designated target coordinates at night or in poor weather conditions.

**ALO**—Air Liaison Officer, an aviation officer on temporary duty with a ground unit to advise on the integration of air and ground operations, and to coordinate such operations.

**ASOC**—Air Support Operations Center, an Air Force command and control agency similar to a Marine Corps DASC. An ASOC was designed to be attached to an Army corps headquarters, and to coordinate the application of close air support within that corps' area of operations.

**ATO**—Air Tasking Order, the daily listing or aircraft sorties flown in a theatre published by an upper command echelon to direct which units were to provide aircraft to meet various missions, including specific call signs, mission types, mission times, and targets and supported units when appropriate.

**BDA**—Bomb Damage Assessment, an estimation of the effectiveness of an air strike based on the observed destruction of enemy weapons, material, and personnel.

**CAP**—Combined Action Program or Combined Action Platoon, the U.S. Marine Corps pacification effort in the I Corps Tactical Zone.

**DAS**—Deep Air Support or Direct Air Support attacks upon the enemy that do not require detailed integration with the fire and movement of friendly forces. These attacks generally occur at expended ranges from friendly troops, such as deep air strikes on the enemy's strategic resources, or interdiction missions designed to stop enemy resources from reaching the battle area.

**DASC**—Direct Air Support Center, a subordinate operational component of a tactical air control system designed for the control and direction of close air support and other tactical air support operations. This term was used in the Marine Air Command and Control System and within the combined air command and control system in Vietnam, although Air Force doctrine used the term Air Support Operations Center (ASOC).

**Direct fire**—attacks upon the enemy using weapons with very flat trajectories, like rifles and tank guns. This term is used to distinguish these weapons from indirect fire weapons, like artillery and mortars. In emergency situations, some artillery can be used in direct fire modes to engage targets at close ranges.

**Fixed-wing aircraft**—Conventional airplane designs consisting of a fuselage and stationary wings which provide lift, in contrast to a helicopter, or rotary-wing aircraft.

**FSCC**—Fire Support Coordination Center, a group of personnel in a single location with centralized communication assets required for the coordination of all forms of fire support a unit may employ. Located at the command post of battalion and larger-sized ground combat units, and FSCC monitors and prioritizes requests for air, artillery, mortar, and naval gunfire support, then deconflicts and approves needed missions,

and facilitates their rapid execution. With regard to air support, the FSCC works closely with the DASC, serving as its primary link to supported ground units.

**FSCL**—Fire Support Coordination Line, also known as the “bomblines” during the Vietnam War. This fire support coordination measure is a line drawn in enemy or disputed territory beyond the region where friendly forces are operating. Beyond the FSCL there are no friendly forces, so air power can be applied permissively in air interdiction. Short of this line friendly forces are in danger of inadvertent attack by aircraft, so a forward air controller’s permission is generally required to employ ordnance, typically in the form of close air support.

**FAC**—Forward Air Controller, a person who coordinates and directs the attacks of strike aircraft. Although a FAC may be airborne or on the ground, in this paper the term “FAC” will generally be used to indicate ground-based controllers, while airborne controllers will be referred to as FAC(A)s. FAC’s are vital to close air support because they have a much closer perspective of events on the ground, and can identify targets which might not be visible to attacking aircraft. Because of the danger of fratricide when engaging in close air support, an aircraft may not drop its bombs until given a “cleared hot” by the FAC.

**FAC(A)**—Forward Air Controller (Airborne), a specifically trained and qualified aviator or aerial observer who performs the dual duties of visual reconnaissance/surveillance and controlling aircraft involved in close air support and deep air support missions. The U.S. Air Force tended to use FAC(A)s independent of ground operations, while Marine Corps doctrine specified that the FAC(A) was an extension of the ground unit’s tactical air control party, assisting its FACs by providing control to strike aircraft as required by the ground commander.

**FO**—Forward Observer, a person who serves as a spotter to direct artillery and mortar missions, submitting calls for fire and observing their effects to correct the fire mission for better results.

**Frag**—A warning order, or preparatory order given in advance of an official operations order. In aviation units. Higher echelon commands generated a daily Air Tasking Order (ATO) with specific information on each sortie flown by its subordinate units. A Frag Order was issued roughly one day in advance so that plans and preparations could begin before the specific mission details were finalized.

**Friendly**—forces of one’s own military or its allies. The opposite of enemy forces.

**H&I Fires**—Harassment and Interdiction Fires, artillery, mortars, or other supporting arms blindly targeted on probably enemy locations when the enemy’s actual location is unknown. This “shot in the dark” method of targeting was largely recognized as a waste of ammunition.

**ICTZ**—I Corps Tactical Zone, the northernmost of South Vietnam’s four zones of military authority, each organized around a combined South Vietnamese Corps headquarters and U.S. military command echelon.

**Indirect fire**—attacks upon the enemy using weapons with a very high trajectory, generally artillery or mortars.

**KBA**—Killed By Air, an estimate of enemy deaths inflicted by enemy air attacks.

**KIA**—Killed In Action, an estimate of friendly or enemy deaths resulting from a combat engagement.

**KSCB**—Khe Sanh Combat Base, the main combat base at Khe Sanh, consisting of everything within the perimeter protecting the runway, but not the hill outposts.

**MAG**—Marine Aircraft Group, the Marine aviation command echelon composed of two or more squadrons. Typically, a MAG operates a single type aircraft, or a collection of aircraft with similar missions operating from a single airfield. During the period covered by this paper MAG-11 was a group composed of fighter and attack jet squadrons operating from Da Nang. An additional jet group focused more closely on close air support was MAG-12, operating A-4 and A-6 aircraft from Chu Lai. That base was also shared by MAG-13, composed of three fighter/attack F-4 squadrons. MAG-16 was a rotary wing, or helicopter group, operating H-34, CH-46, and UH-1 aircraft from Marble Mountain. Further to the north at Phu Bai was another rotary wing group, MAG-36 which operated a similar collection of aircraft. These five aircraft groups, combined with a Marine Air Control Group, made up flying units of the 1st Marine Aircraft Wing.

**MAW**—Marine Aircraft Wing, or Marine Air Wing, the highest aviation-specific command echelon within the Marine Corps. Commanded by a major general and designed to support the aviation demands of a single Marine division, a MAW typically contained the full spectrum of aircraft types and mission capabilities within the Marine Corps arsenal, as well as the tactical air control, air traffic control, and air defense units needed for self sufficient operations. During the period covered by this paper the 1st Marine Aircraft Wing was deployed to Vietnam, where it supported the 1st Marine Division, 3d Marine Division, and at times the army units attached to III MAF in the I Corps area of operations.

**MSQ-77 Combat Skyspot**—The Air Force ground-based radar system used to guide aircraft in attacks on targets at night or in poor weather conditions. A less accurate system similar to the Marine TPQ-10.

**PAVN**—People's Army of Vietnam, the North Viet-

namese title for the NVA.

**Rotary-wing aircraft**—helicopters.

**SAC**—Strategic Air Command, the U.S. Air Force major command responsible for the employment of B-52s, primarily in nuclear deterrence missions.

**Sortie**—a single flight of an aircraft

**TAC(A)**—Tactical Air Controller (Airborne), an aviation officer similar to a FAC(A) who coordinated air attacks in high risk missions. Although TAC(A)s were trained to perform FAC duties in support of ground units, they typically operated in air interdiction missions over enemy-held territory. In this role they did not have to coordinate with ground forces, and flew more survivable jet aircraft.

**TACP**—Tactical Air Control Party, a group of Forward Air Controllers and radiomen assigned to support a ground battalion or similar sized unit by controlling the attacks of aircraft engaged in CAS.

**Targeting**—the process by accurately locating and identifying possible and definite enemy forces and things that might be of value to them, prioritizing them for attack, allocating supporting arms for this purpose, and directing assets for their neutralization or destruction.

**TASE**—Tactical Air Support Element, a group of army personnel assigned to an Air Force or combined DASC in order to verify and prioritize air requests in accordance with the ground unit's needs before the DASC assigned aircraft to this mission. In the Marine Corps, these function was carried out by frequent contact between the DASC and the supported unit's FSCC.

**TOT**—Time on Target—the desired time for an air attack to deliver ordnance on a target.

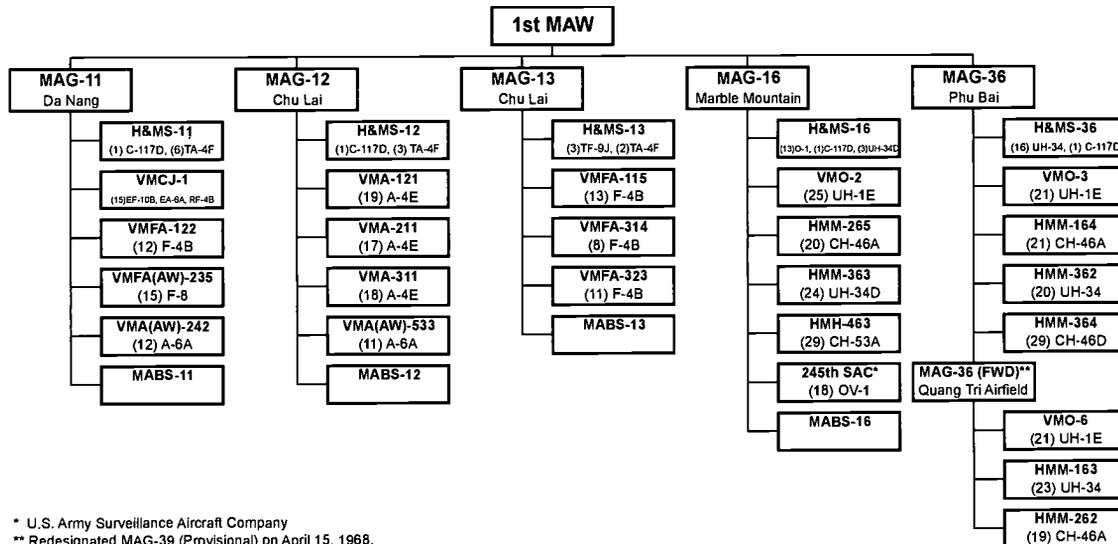
**TPQ-10**—The Marine ground-based radar system used by an Air Support Radar Team (ASRT) to guide aircraft in attacks on targets at night or under poor weather conditions.

**WIA**—Wounded In Action, an estimate of surviving friendly casualties resulting from a combat engagement.

# APPENDIX B: AIR ORDERS OF BATTLE

## 1st Marine Air Wing

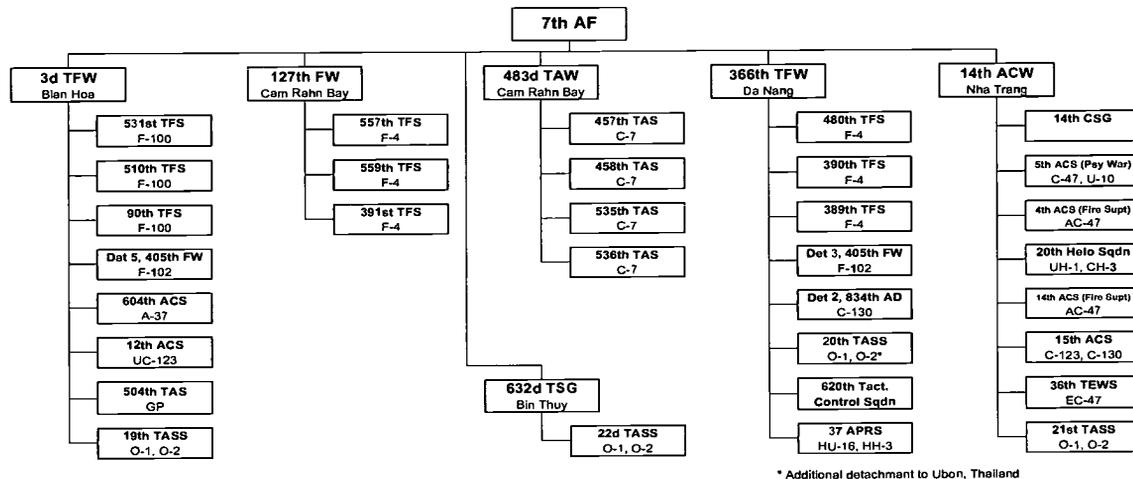
15,000 Marines, 199 fixed-wing aircraft, 273 helicopters



## 7th Air Force

58,000 airmen, 1,085 aircraft

Note: 7th Air Force could also exercise operational control of 13th Air Force units in Thailand (35,000 airmen, 523 aircraft), which it began to employ in South Vietnam in the last week of January 1968.

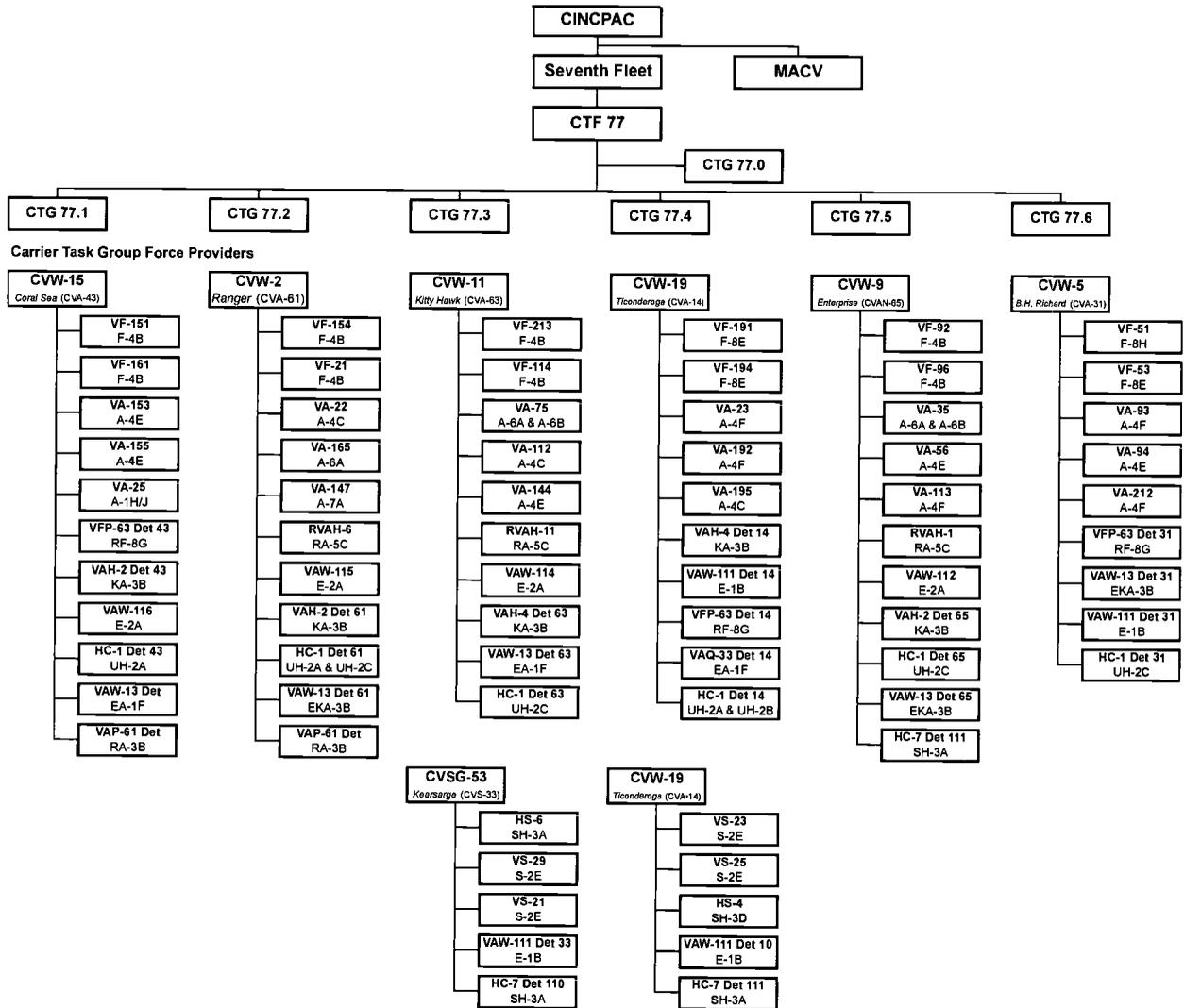


### Regional Strategic Air Command Assets

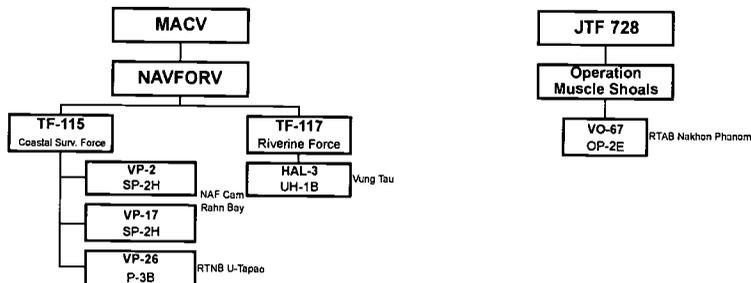


# U.S. Navy

The number of personnel and aircraft varied with the constant rotation of carriers into the carrier task groups on Yankee Station.



## Land Based Air Assets



# APPENDIX C: FRATICIDE AND NEAR FRATICIDE AVIATION INCIDENTS AT KHE SANH

Date	Aircraft	Location	Incident	Cause	Results	Source
2-Mar-1967	2 USAF F-4C	Lang Vei	Bombs, cluster bombs, and rockets dropped on Bru civilians	Misidentified target	112 civilians killed 213 civilians wounded	Murphy, 29; Telfer, 33; Prados and Stubbe, 73; Stubbe, <i>Battalion of Kings</i> , 28-29.
8-Mar-1967	USAF C-123 flareship	Laos	Laotian village strafed during DAS mission	Misidentified target	No casualties	Prados and Stubbe, 74.
24-Apr-1967	USMC UH-1E	Hill 861	Marine hit by stray machine gun round fired by UH-1 providing suppression for CH-46 medical evacuation	Poor fire discipline in close proximity to friendly forces	1 Marine killed	Murphy, 59; Stubbe, <i>Battalion of Kings</i> , 35.
24-Apr-1967	F-4	Hill 861	Marines bombed with two 250-pound bombs by aircraft under FAC(A) control during 3/B/1/9 withdrawal	Unknown	6 Marines killed, more than 12 wounded	Prados and Stubbe, 86; Murphy, 61; Stubbe, <i>Battalion of Kings</i> , 35.
26-Apr-1967	USAF tactical jet	Hill 861	Marine position hit by fragments from stray rocket during CAS attack	Poor fire discipline in close proximity to friendly forces	At least 1 Marine wounded	Murphy, 93.
2-May-1967	USMC UH-1	Hill 881N	Marine position hit by rockets during CAS attack	Pilot failed to follow safety restriction imposed on attack in close proximity to friendlies	1 Marine killed 2 Marines wounded	Murphy, 201.
Summer 1967	UH-1	Unknown	Marine reconnaissance patrol fired upon with rockets when pursued to evacuation site by NVA	Misidentified target	No casualties	Prados and Stubbe, 182.
7-Feb-1968	Unknown	Lang Vei	Bomb dropped inside Laotian position	Unspecified mistake	No casualties	Prados and Stubbe, 325.
7-Feb-1968	A-1	Lang Vei	Napalm canister landed "just feet" from U.S. soldier	Pilot dropped on large group of NVA surrounding friendly forces	Soldier survived, otherwise unknown	Prados and Stubbe, 335.
7-Feb-1968	Unknown	Lang Vei	4 U.S. soldiers and 40 CIDG caught in cluster bomb attack while attempting to flee U.S. compound	Unknown	Unknown	Pisor, 194.
10-Feb-1968	A-1E	KSCB	"Gravel" antipersonnel mines dropped on Marine position	Unknown	1 Marine wounded	Nalty, 94-95, but not in 1/26 Command Chronology as cited.
26-Feb-1968	Navy F-4	KSCB	Two rockets fired into FOB-3 compound during CAS attacks on enemy in close proximity	Unknown	1 Marine killed	Stubbe, <i>Final Formation</i> , 70-71; Stubbe, <i>Battalion of Kings</i> , 221; Stubbe, to Callahan, 12 Dec 2006.
Feb/Mar 1968	USAF F-100	Hill 881S	Four 500-pound bombs dropped on Marine perimeter during CAS attack	Pilot misidentified target and dropped without clearance	Several Marines injured	Dabney, to Callahan, Part 2.
Feb/Mar 1968	F-4	Hill 881S	Four 250-pound bombs dropped on Marine perimeter during CAS attack	Pilot mistook smoke on the hill for a mark and attacked without clearance	2 Marines wounded	Dabney, to Colandreo; Arrotta, 2.
Feb/Mar 1968	A-4	Hill 881S	Following successful CAS rocket attack, pilot strafed Marine position without clearance to attack	Pilot violated FAC's instructions by using inaccurate guns on a close target.	Unknown	Dabney, to Colandreo, and to Callahan, Part 2; Arrotta.
7-Mar-1968	Unknown	KSCB	"Second incident of bomb dropping inside ARVN perimeter"	Unknown	Unknown	Donaghy, to Callahan, Part 6.
5-Apr-1968	Marine F-4	Hill 471	Twenty-six unarmed 500-pound bombs dropped on 1/9 by aircraft under TPQ-10 control	Target cancellation not received by TPQ-10 crew, due to delays in new single management system.	1 Marine wounded	Prados and Stubbe, 434-435; Donaghy, to Callahan, Part 2; Stubbe, <i>Battalion of Kings</i> , 276.
April 1968	Navy A-4	Unknown	Ordnance dropped on an advancing 1st Air Cavalry Division unit by aircraft under TPQ-10 control	Target cancellation not received by TPQ-10 crew due to Army unit unfamiliar with MACCS.	No casualties	Shulimson, 479.



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2. U.S. Department of Defense, Joint Chiefs of Staff, Joint Publication 1-02: *Department of Defense Dictionary of Military and Associated Terms* (Washington, D.C.: Government Printing Office, 2001 [amended through 2005]), 90.
3. Lieutenant General Keith McCutcheon, "Marine Aviation in Vietnam, 1962-1970," *U.S. Naval Institute Proceedings: Naval Review* 1971 (97), no. 819 (May 1971): 146. The U.S. Army began operating AH-1G's in Vietnam in November 1967. These aircraft did support the withdrawal from Khe Sanh, but the scale was very limited, and generally confined to Army air cavalry units.
4. John J. Sbrega, "Southeast Asia," in *Case Studies in the Development of Close Air Support*, ed. Benjamin Franklin Cooling (Washington, D.C.: Office of Air Force History, U.S. Air Force, 1990), 414-415.
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7. Mrozek, 6.
8. Richard H. Kohn and Joseph P. Harahan, eds., *Air Interdiction in World War II, Korea, and Vietnam: An Interview with General Earl E. Partridge, General Jacob E. Smart, and General John W. Vogt, Jr.* (Washington, D.C.: Office of Air Force History, U.S. Air Force, 1986), 2.
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10. Benjamin Franklin Cooling, ed., *Case Studies in the Development of Close Air Support* (Washington, D.C.: Office of Air Force History, U.S. Air Force, 1990), 8.
11. Richard G. Davis, *The 31 Initiatives: A Study in Air Force-Army Cooperation* (Washington, D.C.: Office of Air Force History, U.S. Air Force, 1987), 11.
12. Kohn and Harahan, 49.
13. MacIssac, 644.
14. Mrozek, 123.
15. Sbrega, 413, shows that in joint plans drawn up in 1960, the planned level of Air Force support for Army operations was fixed at five daily sorties per battalion.
16. Mrozek, 21.
17. Sbrega, 420.
18. John Schlight, *A War Too Long: The USAF in Southeast Asia, 1961-1975* (Washington, D.C.: Air Force History and Museums Program, 1996), 5-6.
19. Kohn and Harahan, 60.
20. Sbrega, 413.
21. Ibid., 455-456.
22. Sbrega, 418.
23. Mrozek, 17.
24. Sbrega, 414.
25. Ibid., 416.

26. Davis, 17.
27. Sbrega, 415.
28. Davis, 16.
29. Sbrega, 416.
30. General William W. Momyer, *Airpower in Three Wars* (Washington, D.C.: U.S. Government Printing Office, 1978), 261.
31. Sbrega, 428-430. Davis, 19, shows that the Army responded to this significant compromise on the part of the Air Force by reducing its number of Caribou and Mohawk aircraft, returning to the Air Force a portion of the transport and observation territory which had been infringed upon. The Army also decreased its air mobility plan from five divisions to just one, but it was determined to protect this new concept. In 1965 the Army pressed ahead with the 1st Air Cavalry Division, and likewise proceeded with the development of an aerial fire support system. These efforts were critical to the production of an attack helicopter.
32. Sbrega, 422.
33. Gary Robert Lester, *Mosquitoes to Wolves: The Evolution of the Airborne Forward Air Controller* (Maxwell AFB, Alabama: Air University Press, 1977), 125.
34. Schlight, 23.
35. Momyer, 265.
36. Sbrega, 454.
37. Momyer, 277.
38. Sbrega, 469.
39. Cooling, 1.
40. Sbrega, 445.
41. Lester, 109.
42. John W. Ellis Jr., *The Airborne Forward Air Controller: Past Accomplishments and Future Opportunities* (Santa Monica: The Rand Corporation, 1978), 13.
43. Lester, 109.
44. House Committee on Armed Services, Special Subcommittee on Tactical Air Support, Close Air Support, 89th Cong., 2d sess., 1966, Committee Print 44, 4862-4864.
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46. Ellis, 14.
47. Lester, 121-122, 124, 142.
48. Schlight, 26-27.
49. Lester, 114.
50. House Committee on Armed Services, 4861-4862.
51. Lester, 118-119.
52. Ibid., 114-115.
53. Ibid., 120.
54. Lester, 116-118.
55. Ibid., 177, shows that the 23d Tactical Air Support Squadron, composed of O-1 and O-2 aircraft, was established in Nakhon Phanom, Thailand, in April 1966, having begun operations there as a subset of another unit in January.
56. Momyer, 269.
57. Schlight, 27-28.

58. Lester, 25.
59. Momyer, 269.
60. Sunderland, 54.
61. Sbrega, 418.
62. House Committee on Armed Services, 4867.
63. Momyer, 32, 274.
64. Momyer, 270; and Sbrega, 441.
65. Sbrega, 418.
66. House Committee on Armed Services, 4867.
67. Davis, 21.
68. House Committee on Armed Services, 4864.
69. Richard S. Drury, *USAF Close Air Support* (Singapore: Motorbooks International, 1991), 7-8.
70. Kohn and Harahan, 46.
71. Mrozek, 125.
72. *Ibid.*, 125.
73. Sbrega, 444.
74. *Ibid.*, 415.
75. Mrozek, 127-128.
76. Sbrega, 444; and Schlight, 31-32.
77. Mrozek, 128.
78. Momyer, 282.
79. Sbrega, 438. These aircraft were both replaced by the OV-10 by June 1969, which began service in Vietnam with the Marine Corps and Air Force in July 1968.
80. House Committee on Armed Services, 4865.
81. Schlight, 40.
82. Major General Keith McCutcheon, "Air Support for III MAF," *Marine Corps Gazette* 51, no. 8 (August 1967): 19-23.
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88. *Ibid.*, Chapter X, 19.
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90. "Weakness in Air Force," *U.S. News and World Report*, 3 November 1950, 17-19.
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93. Lieutenant Colonel R.P. Keller, "Trained For Support," *Marine Corps Gazette* 38, no. 5 (May 1954): 30.

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99. Tutton, 50.
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103. McCutcheon, "Marine Corps Aviation: An Overview," 27.
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107. Arrotta, 1.
108. Donaghy, Part 1.
109. Sbrega, 459; and McCutcheon, "Marine Aviation in Vietnam," 141.
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119. Lieutenant Colonel Clinton A. Smith, Tampa, letter to Shawn P. Callahan, Annapolis, 8 July 2005, Shawn P. Callahan Papers, Archives and Special Collections, Marine Corps University Library, Quantico, Virginia.
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122. McCutcheon, "Marine Aviation in Vietnam," 141.
123. House Committee on Armed Services, 4872-4873.
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125. Sbraga, 460.
126. Shulimson, 58-59.
127. Ibid., 58.
128. John Prados and Ray W. Stubbe, *Valley of Decision: The Siege of Khe Sanh* (New York: Houghton Mifflin, 1991; reprint, Annapolis: Naval Institute Press, 2004), 16 (page citations are to the reprint edition).
129. Edward F. Murphy, *The Hill Fights: The First Battle of Khe Sanh* (New York: Ballantine Books, 2003), 8; and Prados and Stubbe, 22-23.
130. Murphy, 9; and Prados and Stubbe, 19-21.
131. Prados and Stubbe, 37.
132. Ibid., 46.
133. Murphy, 3.
134. Ibid., 10-12.
135. Murphy, 14.
136. Major Gary L. Telfer and Lieutenant Colonel Lane Rogers, *U.S. Marines in Vietnam: Fighting the North Vietnamese, 1967* (Washington, D.C.: History and Museums Division, Headquarters Marine Corps, 1984), 31.
137. In March 1966, the A Shau Special Forces Camp, 55 kilometers southeast of Khe Sanh, was attacked and overrun by the NVA when the low cloud ceilings created by seasonal monsoon weather prevented air support. After a hurried evacuation on 9 March, only about 150 of the approximately 400 camp members escaped, most by fleeing into the jungle. Murphy, 7. After 1/3 arrived at Khe Sanh for Operation Prairie, Westmoreland visited the battalion commander and told him, "Well, I'm not going to have another A Shau Valley up here. That's why you're here." Murphy, 17.
138. Murphy, 18-19, 44.
139. Ibid., 19.
140. These soldiers attempted to maintain their isolated position until it was too late. During the fateful attacks of January 1968 that placed the Khe Sanh Combat Base under siege, the Green Berets and CIDG were overrun by the NVA. The commander of the 26th Marines at Khe Sanh determined any relief force would be walking into an ambush, and was therefore futile. Most historians of the battle agree that this was a very wise but unfortunate decision.
141. Telfer and Rogers, 203.
142. Murphy, xiv.

143. Prados and Stubbe, 70-71.
144. Telfer and Rogers, 34.
145. Prados and Stubbe, 83.
146. Murphy, 44.
147. Ibid., 45.
148. Telfer and Rogers, 36-37.
149. Murphy, 58.
150. Prados and Stubbe, 87-88.
151. Telfer, 38.
152. Murphy, 112, states that 382,000 pounds of bombs were dropped on 27 April alone. Prados and Stubbe, 91, totals the aviation ordnance of 28 April at 382,700 pounds.
153. Telfer and Rogers, 39, states that 1st MAW dropped 518,700 pounds of ordnance, or nearly 68 percent of the total. Subtracting the total payload of two B-52's (120,000 pounds) from the two-day total, Marine tactical aircraft dropped close to 80 percent of the remaining ordnance.
154. Telfer and Rogers, 39.
155. Murphy, 112.
156. Telfer and Rogers, 39.
157. Prados and Stubbe, 62.
158. Enemy KIA from Telfer and Rogers, 40-41. Friendly losses from Ray W. Stubbe, *The Final Formation: Those Who Died Because of Khe Sanh* (Wauwatosa, Wisconsin: by the author, 1995), 17-18.
159. Prados and Stubbe, 99; and Telfer and Rogers, 229-231.
160. Murphy, 150.
161. Robert Pisor, *The End of the Line: The Siege of Khe Sanh* (New York: W.W. Norton & Company, 1982), 19.
162. Telfer and Rogers, 41.
163. Pisor, 19.
164. Telfer and Rogers, 41.
165. Ibid., 42.
166. Pisor, 18.
167. Telfer and Rogers, 41.
168. Pisor, 18.
169. Telfer and Rogers, 42-43.
170. Murphy, 191; and Telfer and Rogers, 43-44.
171. Prados and Stubbe, 98-99.
172. Murphy, 211-212.
173. Prados and Stubbe, 95-97.
174. Telfer and Rogers, 44-45.
175. Murphy, 215.
176. Murphy, 221-222.
177. Telfer and Rogers, 45.
178. Prados and Stubbe, 102; and Telfer and Rogers, 45.
179. Telfer and Rogers, 45.
180. Telfer and Rogers, 45.
181. Pisor, 20.
182. Shulimson, 61, and Prados and Stubbe, 155.
183. Pisor, 40-41.
184. Prados and Stubbe, 216.

185. Mrozek, 73.
186. Prados and Stubbe, 195.
187. Pisor, 94.
188. Pisor, 95.
189. Shulimson, 64.
190. Prados and Stubbe, 203.
191. Pisor, 103.
192. Colonel William H. Dabney, Interview by Benis M. Frank, 20 May 1982. Transcript. Marine Corps Oral History Collection, Marine Corps Historical Center, Washington, D.C., 17-18.
193. Ibid., 21.
194. Pisor, 23.
195. Prados and Stubbe, 214.
196. Pisor, 17.
197. Prados and Stubbe, 198.
198. Pisor, 77-78.
199. Prados and Stubbe, 361-363.
200. Shulimson, 67.
201. Pisor, 135.
202. Telfer and Rogers, 21-22.
203. Ibid., 95.
204. Ibid., 102-103.
205. Ibid., 103.
206. Telfer and Rogers, 203.
207. Pisor, 70.
208. Ibid., 69-70.
209. Prados and Stubbe, 159.
210. Pisor, 70.
211. Mrozek, 73.
212. Pisor, 122-124, 133-136, 138.
213. Pisor, 70-71.
214. Ibid., 138.
215. Bernard C. Nalty, *Air Power and the Fight for Khe Sanh* (Washington, D.C.: Office of Air Force History, U.S. Air Force, 1973), 42; Lieutenant General Victor H. Krulak, *First to Fight: An Inside View of the U.S. Marine Corps* (Annapolis: Naval Institute Press, 1999), 216; and Pisor, 211.
216. U.S. Marine Corps, Marine Aerial Refueler Transport Squadron-152, Marine Aerial Refueler Transport Squadron Command Chronology, 1 January to 31 January 1968 (Futenma, Japan, 1968), 3; and U.S. Marine Corps, Marine Aerial Refueler Transport Squadron-152, Marine Aerial Refueler Transport Squadron Command Chronology, 1 February to 29 February 1968 (Futenma, Japan, 1968), 3; and U.S. Marine Corps, Marine Aerial Refueler Transport Squadron-152, Marine Aerial Refueler Transport Squadron Command Chronology, 1 March to 31 March 1968 (Futenma, Japan, 1968), 3; The 1st Marine Air Wing kept its KC-130 squadron based in Okinawa, and rotated aircraft through a five-plane detachment in Da Nang, in order to avoid inflating the apparent number of aircraft based in Japan.
217. Shulimson, 66, and Pisor, 139. Martin Windrow, *The Last Valley: Dien Bien Phu and the French Defeat in Vietnam* (Cambridge: Da Capo Press, 2004), 268-272 and 556-561, presents an excellent analysis of the additional factors which hampered the full application of air power at Dien Bien Phu.
218. Pisor, 37.

219. Shulimson, 471.
220. Prados and Stubbe, 220.
221. Pisor, 103.
222. Pisor, 37-38.
223. Ibid., 124.
224. Shulimson, 473.
225. Prados and Stubbe, 236.
226. Pisor, 27.
227. Prados and Stubbe, 237.
228. Ibid., 224.
229. Pisor, 17.
230. Murphy, 235.
231. Pisor, 104.
232. Prados and Stubbe, 228.
233. Dabney, 77-78.
234. Pisor, 29-31.
235. Shulimson, 71.
236. Prados and Stubbe, 231.
237. Hammel, 55-56; Prados and Stubbe, 231.
238. Pisor, 56.
239. Pisor, 109.
240. Ibid., 113-114.
241. Eric Hammel, *Khe Sanh: Siege in the Clouds, An Oral History* (Pacifica, California: Pacifica Military History, 1989; reprint, New York: ibooks, inc., 2004), 81-82 (page citations are to the reprint edition).
242. Hammel, 77.
243. Pisor, 115-118.
244. Hammel, 84-85.
245. Hammel, 87.
246. Hammel, 70, 170.
247. Pisor, 131. In addition to the normal tension between regular and irregular forces, and forces of different nations, the Americans had the memory of the attack on the Lang Vei Special Forces Camp during the Hill Fights. On May 4, 1967, enemy agents infiltrated the CIDG unit and killed some perimeter guards, enabling the entry of another force which caused significant damage and killed the American CO and XO of the Special Forces Team.
248. Hammel, 123, Pisor, 137.
249. Hammel, 148, 276; and Prados and Stubbe, 296.
250. Shulimson, 265; and Nalty, 25.
251. Shulimson, 270-272; and Nalty, 93.
252. Prados and Stubbe, 265.
253. Murphy, 239.
254. Prados and Stubbe, 327; and Shulimson, 275.
255. Pisor, 197.
256. Prados and Stubbe, 336-337; and Shulimson, 276.
257. Pisor, 197.
258. Shulimson, 278.
259. Hammel, 200, and Shulimson, 277-278.
260. Hammel, 200.
261. Prados and Stubbe, 280.

262. Pisor, 213.
263. Prados and Stubbe, 443.
264. Colonel William H. Dabney, Lexington, Virginia, letter to Major Biagio Colandreo Jr., Naval Amphibious Base Little Creek, Virginia, circa 1999, transcript in the hand of Shawn P. Callahan, Annapolis.
265. Hammel, 271-272.
266. Shulimson, 279. Prados and Stubbe quote estimates that the NVA may have fired as many as 1,700 rounds that day.
267. Nalty, 38.
268. Prados and Stubbe, 398. Colonel Dabney insists that 130mm guns actually began firing from positions in Laos on 21 January, when heavy artillery was observed shooting over Hill 881S toward the combat base. This continued regularly afterwards, and was reported by Dabney, but he states that the 26th Marines probably did not accept this assessment because the artillery fire was often mixed with rocket fire, which masked its effects when they arrived at KSCB. From 881S, it was much easier to distinguish between heavy artillery passing overhead and rockets being fired from the immediate vicinity of the hill. Colonel William H. Dabney, Comments on draft ms, 7 December 2006, transcript in the hand of Shawn P. Callahan, Annapolis.
269. Glen Prentice, Comments on draft ms, 26 April 2007, transcript in the hand of Shawn P. Callahan, Annapolis.
270. Hammel, 354.
271. Ibid., 112.
272. Keller, 77.
273. Prados and Stubbe, 53-54.
274. Nalty, 62.
275. Nalty, 35-38, 45.
276. Shulimson, 481.
277. Prados and Stubbe, 377-378, and Hammel 244-245.
278. Nalty, 50, 58.
279. Ibid., 63-64.
280. Prados and Stubbe, 391.
281. Mrozek, 83.
282. Mrozek, 83; and Nalty, 42-59.
283. 8,120 tons of supplies were delivered by Air Force parachute drops and low altitude delivery systems, and another 4,310 tons were delivered by Air Force aircraft landing at the base. 1,926 tons were delivered by Marine Corps fixed-wing aircraft landing at the combat base, while marine helicopters delivered another 3,000 tons, predominantly to the hill outposts. Director, Historical Division, Headquarters, U.S. Marine Corps comments on Director of Information Press Query #41, "Air Delivery" by 1stLt Barney Halloran, USMC" of 20 March 1970. Records of the U.S. Marine Corps, History and Museums Division Publication Background Files: USMC in Vietnam, 1967-69, National Archives, College Park, Maryland.
284. Prados and Stubbe, 395, Hammel, 290-291.
285. Hammel, 249.
286. Pisor, 232.
287. Shulimson, 281; and Nalty, 96.
288. Nalty, 96; and Shulimson, 281.
289. Hammel, 315.
290. Ibid., 355-356.

291. Nalty, 96.
292. Prados and Stubbe, 424-425.
293. Dabney, interview transcript, 22; and Pisor, 32.
294. Dabney, interview transcript, 4-5.
295. Prados and Stubbe, 177.
296. Krulak, 217.
297. Ibid., 218-219.
298. Edward F. Murphy, *Semper Fi Vietnam: From Da Nang to the DMZ, Marine Corps Campaigns, 1965-1975* (New York: Ballantine Books, 1997), 183.
299. Dave Richard Palmer, *Summons of the Trumpet: U.S.-Vietnam in Perspective* (San Rafael, California: Presidio Press, 1978), 172.
300. Dabney, interview transcript, 27.
301. Military History Institute of Vietnam, *Victory in Vietnam: The Official History of the People's Army of Vietnam, 1954-1975*, trans. Merle L. Pribbenow (Lawrence, Kansas: University Press of Kansas, 2002), 216-230.
302. Sedgwick D. Tourison Jr., *B5-T8 in 48 QXD: The Secret Official History of the North Vietnamese Army at the Siege of Khe Sanh, Vietnam, Spring, 1968* (Wauwatosa, Wisconsin: Khe Sanh Veterans, Inc., 2006), 3-4.
303. Tourison, 5.
304. Tourison, 5.
305. Tourison, 5-7, 16.
306. Tourison, 14, 34.
307. General Directorate for Rear Services, Rear Service Operations: 1968 Spring-Summer Khe Sanh Route 9 Campaign, 1988, transcript in the hands of Ray W. Stubbe, Wauwatosa, WI.
308. Tourison, 27-28, 13.
309. Tourison, 10.
310. Tourison, 14.
311. Tourison, 34.
312. Tourison, 78, 67.
313. Tourison, 30.
314. Department of Defense, *An Analysis of the Khe Sanh Battle*, 4.
315. Tourison, 92.
316. Tourison, 37.
317. Tourison, 79.
318. Tourison, 37.
319. Tourison, 81.
320. Tourison, 39.
321. Tourison, 93, 95.
322. General Directorate for Rear Services.
323. Tourison, 92.
324. Prados and Stubbe, 2; Shulimson, 476-477; and Westmoreland as quoted in Department of Defense, *The Battle of Khe Sanh*, videotape, 15 min., (Washington D.C.: Aerospace Audio Visual Service, circa 1968), and in "B-52 at War," available from [http://www.faqs.org/docs/air/avb52\\_2.html](http://www.faqs.org/docs/air/avb52_2.html); accessed 11 August 2005.
325. Tourison, 44. Note the NVA use of the word "siege" to describe phase II operations.
326. Krulak, 215.
327. Nalty, 96; and Pisor, 176.
328. Pisor, 241.

329. General William C. Westmoreland, Washington, D.C., letter to General Leonard F. Chapman, Washington, D.C., regarding comments on draft monograph of Captain Moyer S. Shore, *The Battle for Khe Sanh*, 29 March 1969, transcript in the records of the U.S. Marine Corps, History and Museums Division Publication Background Files: USMC in Vietnam, 1967-69, National Archives, College Park, Maryland, 3.
330. Lieutenant General Robert E. Cushman Jr., Da Nang, Vietnam, letter to Brigadier General W.D. Sawyer, Washington, D.C. regarding comments on draft monograph of Captain Moyer S. Shore, *The Battle for Khe Sanh*, 26 December 1968, transcript in the records of the U.S. Marine Corps, History and Museums Division Publication Background Files: USMC in Vietnam, 1967-69, National Archives, College Park, Maryland.
331. Prados and Stubbe, 418.
332. Jack Shulimson, "The Marine War: III MAF in Vietnam, 1965-1971," available from [http://www.vietnam.ttu.edu/vietnamcenter/events/1996\\_Symposium/96papers/marwar.htm](http://www.vietnam.ttu.edu/vietnamcenter/events/1996_Symposium/96papers/marwar.htm); accessed 14 May 2004.
333. Pisor, 240.
334. Prados and Stubbe, 420-421.
335. Ibid., 444.
336. Ibid., 428-429.
337. Shulimson, *The Defining Year*, 284; and Nalty, 99.
338. Prados and Stubbe, 439-440; and Colonel Richard D. Camp Jr., *Lima-6: A Marine Company Commander in Vietnam, June 1967 - January 1968* (New York: Atheneum, 1989), 283.
339. Lieutenant General Robert E. Cushman Jr., Da Nang, Vietnam, letter to Lieutenant General V.J. Van Ryzn, Washington, D.C. regarding comments on draft monograph of Captain Moyer S. Shore, *The Battle for Khe Sanh*, 23 March 1969, transcript in the records of the U.S. Marine Corps, History and Museums Division Publication Background Files: USMC in Vietnam, 1967-69, National Archives, College Park, Maryland, 2.
340. Shulimson, 285; and Prados and Stubbe, 436.
341. Prados and Stubbe, 440-441.
342. Cushman, to Van Ryzn, 2-3.
343. Prados and Stubbe, 440.
344. Nalty, 100.
345. Murphy, 241.
346. Prados and Stubbe, 448.
347. Shulimson, *The Defining Year*, 312.
348. Hammel, 416-417.
349. Ibid., 422.
350. Hammel, 425-434; and Murphy, 240.
351. Nalty, 102.
352. Hammel, 436.
353. Shulimson, *The Defining Year*, 317-319.
354. Ibid., 320.
355. Shulimson, *The Defining Year*, 321-324.
356. Prados and Stubbe, 448.
357. Murphy, 241.
358. Prados and Stubbe, 448; and Shulimson, *The Defining Year*, 326.
359. Shulimson, *The Defining Year*, 467-468.
360. U.S. Marine Corps, 1st Marine Air Wing, 1st

- Marine Air Wing Command Chronology, 1 January to 31 January 1968 (Da Nang, RVN, 1968), 2-4.
361. Shulimson, *The Defining Year*, 508
362. Shulimson, *The Defining Year*, 508. On page 498, Shulimson mentions USAF planning a sustained sortie rate of 1.2, but this was still considerably less than the Marines' 2.0 sortie rate.
363. Shulimson, *The Defining Year*, 472.
364. Sunderland, 46. Lester, 115-116, presents additional evidence that Momyer had fixated on the single management issue more than the massing of air power for a battle of annihilation at Khe Sanh by examining his decisions with regard to Air Force assets in Thailand. Since the 7th Air Force was formed in April 1966, its commander had operational control of Air Force units in Thailand as well, but Momyer did not chose to use these assets in Vietnam until the Tet offensive began, after the "destroy" phase of Niagara had begun.
365. Ray W. Stubbe, *Battalion of Kings: A Tribute to Our Fallen Brothers Who Died Because of the Battle of Khe Sanh, Vietnam* (Milwaukee: Khe Sanh Veterans, Inc., 2005), 276.
366. Ibid.
367. Telfer, 202.
368. Mrozek, 41, shows that technically, a third DASC existed for the control of Vietnamese Air Force aircraft, I DASC, but the volume of traffic and air support requests handled by this DASC was so small compared to the other DASC's that it had no adverse effects.
369. McCutcheon, "Marine Aviation in Vietnam," 140.
370. Prados and Stubbe, 295.
371. Shulimson, *The Defining Year*, 474.
372. Ibid.
373. Hammel, 157.
374. Ibid., 325.
375. Hammel, 155.
376. U.S. Marine Corps, Marine Observation Squadron-2, Marine Observation Squadron-2 Command Chronology, 1 January to 31 January 1968 (Da Nang, RVN, 1968), 6.
377. Nalty, 90.
378. Pisor, 105-106.
379. Ibid., 106-107.
380. Pisor, 217.
381. Hammel, 177.
382. Prados and Stubbe, 301-302.
383. Hammel, 177-178; and Ray W. Stubbe, *Khe Sanh and the Mongol Prince* (Wauwatosa, Wisconsin: by the author, 2002), 23. Colonel Dabney affirms a general suspicion of Muscle Shoals information created by the paradoxical system of collecting tactical intelligence data and sending it to the highest levels of command for analysis, far from the battlefield and people most affected by that intelligence. By doing so, the information was subjected to the bureaucratic politics of multiple intelligence agencies sometimes working at cross-purposes. Each agency tended to overvalue the importance of its own contributions and undervalue the observations of other agencies, including units engaged with the enemy, ultimately at the expense of providing combat units with a better multi-source intelligence picture. Colonel William H. Dabney, Comments on draft ms, 7 December 2006, transcript in the hand of Shawn P. Callahan, Annapolis.
384. Hammel, 179, 301; and Prados and Stubbe; 415-416.

385. Prados and Stubbe, 301.
386. Hammel, 301.
387. Hammel, 451-452.
388. Prados and Stubbe, 297, is the most authoritative source on statistics for the battle, having integrated numerous sources. This work totals the contribution of B-52s at 59,542 tons of bombs dropped, compared to 39,179 dropped by tactical aircraft.
389. Shulimson, *The Defining Year*, 475.
390. Murphy, 18.
391. Sbrega, 445.
392. Mrozek, 40-41.
393. Mrozek, 23.
394. Shulimson, *The Defining Year*, 476; and Hammel, 150.
395. Shulimson, *The Defining Year*, 476, and Hammel, 150.
396. Shulimson, *The Defining Year*, 476.
397. Ronald J. Drez and Douglas Brinkley, *Voices of Courage: The Battle for Khe Sanh, Vietnam* (New York: Bulfinch Press, 2005), 168.
398. Hammel, 149.
399. Shulimson, *The Defining Year*, 68.
400. Pisor, 105.
401. Pisor, 141-143.
402. Tourison, 53.
403. Nalty, 83; and Pisor, 216.
404. Shulimson, *The Defining Year*, 476.
405. Prados and Stubbe, 297-298.
406. Ibid., 416.
407. Hammel, 291.
408. Prados and Stubbe, 304.
409. Dabney, interview transcript, 79.
410. Prados and Stubbe, 407.
411. Prados and Stubbe, 406.
412. Dabney, interview transcript, 25-26.
413. Hammel, 152.
414. Prados and Stubbe, 409.
415. Ibid., 411.
416. Tourison, 37.
417. "B-52 at War."
418. Department of Defense, *The Battle of Khe Sanh*.
419. Prados and Stubbe., 2.
420. Tourison, 79.
421. Shulimson, *The Defining Year*, 476-477.
422. Hammel, 150.
423. Hammel, 151.
424. Mrozek, 82.
425. Pisor, 247-248.
426. Shulimson, *The Defining Year*, 270.
427. Prados and Stubbe, 458.
428. Tourison, 92. Examining the casualty statistics of one regiment which was involved in both the encirclement of Khe Sanh Combat Base and in the mobile operations which followed, the official campaign history reports 62.3 percent casualties from air strikes, 24.6 percent from artillery

- and mortars, and 11.0 percent from direct fire during the static encirclement. Comparing this to the 37.8 percent sustained due to air strikes, 47.5 percent due to indirect fires, and 13.1 percent due to direct fires during the mobile phase, it is apparent that the unpredictable and fleeting contacts created by the more dynamic mobile phase decreased the effectiveness of air power compared to the other, more responsive weapons organic to the ground combat element.
429. Dabney, interview transcript, 83.
430. Prados and Stubbe, 297, 411. Out of the 2,548 B-52 sorties flown during Operation Niagara, 589 were classified as close-in missions.
431. Ibid., 457.
432. Tourison, 92.
433. Shulimson, *The Defining Year*, 476.
434. Shulimson, *The Defining Year*, 486.
435. Hammel, 303.
436. Shulimson, *The Defining Year*, 476.
437. Hammel, 452-453.
438. Hammel, 454-455.
439. "B-52 at War"
440. Momyer, 309.
441. Pisor, 217.
442. Shulimson, *The Defining Year*, 63.
443. Krulak, 114-119.
444. McCutcheon, "Marine Aviation in Vietnam," 139.
445. U.S. Marine Corps, 1st Marine Air Wing Command Chronology, 1 January to 31 January 1968, 2-4..
446. Prados and Stubbe, 223-224.
447. Ibid., 406.
448. Shulimson, *The Defining Year*, 477.
449. Ibid., 477.
450. Shulimson, *The Defining Year*, 477.
451. Ibid., 477-478.
452. Pisor, 185.
453. Mrozek, 81.
454. Hammel, 156.
455. Ibid., 185-186.
456. Shulimson, *The Defining Year*, 477.
457. Ibid., 477.
458. Captain Moyers S. Shore II, *The Battle for Khe Sanh* (Washington, D.C.: History and Museums Division, Headquarters U.S. Marine Corps, 1969), 103.
459. Krulak, 119.
460. Ibid., 119.
461. Ibid., 216.
462. Momyer, 178.
463. Nalty, 66-67.
464. Prados and Stubbe, 42, 48, and 194.
465. Sbrega, 451; and Nalty, 67.
466. McCutcheon, "Marine Aviation in Vietnam," 139.
467. Momyer, 178-179.
468. Schligh, 30.
469. Sbrega, 449-500.

470. Shulimson, *The Defining Year*, 469.
471. Shore, 104.
472. Nalty, 66.
473. Nalty, 67.
474. Nalty, 67.
475. Pisor, 216.
476. Arrotta, 2.
477. Momyer, 293.
478. Nalty, 61-62.
479. *Ibid.*, 62.
480. Hammel, 153. Egen notes that the apparent chaos was magnified by an insufficient number of air control frequencies. This resulted in confusion between air strikes in different locations being simultaneously coordinated on the same frequency.
481. Hammel, 153-154.
482. *Ibid.*, 295.
483. *Ibid.*, 204-205.
484. *Ibid.*, 355.
485. Dabney, to Colandreo.
486. Shulimson, *The Defining Year*, 469.
487. *Ibid.*, 478.
488. Lester, 133-134. Of note, this source follows the Air Force tendency to overlook the role of the ground FAC at Khe Sanh, erroneously giving these FAC(A) sorties credit for controlling all the ordnance dropped in Operation Niagara.
489. Nalty, 60-65; Shulimson, *The Defining Year*, 478; and Andersen.
490. Shulimson, *The Defining Year*, 266.
491. Pisor, 220.
492. Hammel, 297.
493. Nalty, 66.
494. *Ibid.*, 64.
495. Nalty, 62.
496. Colonel William H. Dabney, Lexington, Virginia, letter to Shawn P. Callahan, Annapolis, 21 August 2004, transcript in three parts in the hand of Shawn P. Callahan, Annapolis, Part 3.
497. Dabney, to Colandreo.
498. Dabney, to Callahan, Part 3.
499. Nalty, 56.
500. Hammel, 207.
501. U.S. Marine Corps, 1st Marine Air Wing, 1st Marine Air Wing Command Chronology, 1 February to 29 February 1968 (Da Nang, RVN, 1968), 2-3.
502. Mrozek, 84.
503. McCutcheon, "Marine Corps Aviation: An Overview," 27.
504. Shulimson, *The Defining Year*, 485.
505. *Ibid.*, 485.
506. Dabney, interview transcript, 87-88.
507. Dabney, to Callahan, Part 1.
508. Nalty, 62-63.
509. Dabney, to Callahan, Part 1.
510. Prados and Stubbe, 572.
511. Nalty, 33-34.

512. Shulimson, *The Defining Year*, 475.
513. Hammel, 205.
514. Shulimson, *The Defining Year*, 475.
515. Hammel, 239.
516. Dabney to Callahan, Part 3.
517. Ibid., Part 1.
518. Ibid., Part 1.
519. Dabney, to Colandreo. The specific restriction to use Marine air support inside of 1,000 meters has been independently stated by at least one other Marine who was in Vietnam at the time, specifically George A. Finch III, Santa Rosa, California, letter to Shawn P. Callahan, Annapolis, 11 July 2005, Shawn P. Callahan Papers, Archives and Special Collections, Marine Corps University Library, Quantico, Virginia.
520. Andersen.
521. Shulimson, *The Defining Year*, 71; Hammel, 50; and Dabney, to Callahan, Part 1.
522. Prados and Stubbe, 260.
523. Drez and Brinkley, 172-173.
524. Prados and Stubbe, 391.
525. Murphy, 36.
526. Hammel, 308.
527. Prados and Stubbe, 74; and Murphy, 29.
528. Murphy, 93-94.
529. Dabney to Callahan, Part 2, and Arrotta, 2. Dabney actually describes the aircraft as F-101s, but these were not in use in Vietnam at the time, and are similar in form to the F-100s that Arrotta describes in the same incident.
530. Dabney to Callahan, Part 3.
531. Murphy, 59, 182, and 201.
532. Andersen.
533. Dabney to Callahan, Part 3.
534. Pisor, 164.
535. Ibid., 219-220.
536. Lieutenant Colonel David L. Steele, Kirkland, Washington, letter to Shawn P. Callahan, Annapolis, 11 July 2005, Shawn P. Callahan Papers, Archives and Special Collections, Marine Corps University Library, Quantico, Virginia.
537. Hammel, 83.
538. Pisor, 199.
539. Hammel, 198.
540. Nalty, 62.
541. Hammel, 292; and Prados and Stubbe, 397.
542. Shulimson, *The Defining Year*, 278.
543. Tourison, 38.
544. Prados and Stubbe, 397.
545. Lieutenant Colonel James B. Wilkinson, Comments on draft ms, 22 November 2006, transcript in the hand of Shawn P. Callahan, Annapolis.
546. Hammel, 351.
547. Tourison, 79. The stand-off requirements imposed on B-52s in fact ensured that they were not involved in any fratricide incidents at Khe Sanh, but it remains clear that the NVA understood why they had to get close to Marine positions, and did so.
548. Tourison, 82.
549. Colonel Dabney states that the first indication of an impending B-52 attack was the blank-

ing out of radio communication frequencies which occurred three to four minutes before the attack, which the Marines concluded was from the jammers the B-52s used when approaching the DMZ and North Vietnamese surface-to-air missile defenses. The Marines frequently heard NVA intrusion on American frequencies, so the NVA must have been aware of the same phenomenon. A few minutes, however, was insufficient time to take adequate countermeasures against a B-52

bombardment. Colonel William H. Dabney, Comments on draft ms, 7 December 2006, transcript in the hand of Shawn P. Callahan, Annapolis.

550. Hammel, 311.

551. Dabney, interview transcript, 35.

552. Nalty, 60.

553. Prados and Stubbe, 297.



*Back Cover:* The logotype reproduced on the back cover has as its major element the oldest military insignia in continuous use in the United States. It first appeared, as shown here, on Marine Corps buttons adopted in 1804. With the stars changed to five points, the device has continued on Marine Corps buttons to the present day.

