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PROJECT
Contemporary
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REPORT

ROLLING THUNDER
JULY 1965 - DECEMBER 1966

15 JULY 1967

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HQ PACAF

**Directorate, Tactical Evaluation
CHECO Division**

Prepared by: MR WESLEY R. C. MELYAN
MISS LEE BONETTI

S.E. Asia Team

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Edward C. Burtenshaw
EDWARD C. BURTENSCHAW, Col, USAF
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FOREWORD

This study of air operations against North Vietnam - ROLLING THUNDER - is concerned primarily with the policies and plans governing the program. Emphasis has been placed on the Air Force role although vital contributions made by other services also must be recorded in order to achieve a well-balanced picture. It is hoped that this report, when read in conjunction with other CHECO studies dealing with different facets of ROLLING THUNDER, will contribute toward a better understanding of this program.

A definitive study and evaluation of ROLLING THUNDER remains in the future since the program is still in progress. For the present, it can be said that air operations have not stopped the flow of men and material from the North into South Vietnam, but they have forced Hanoi to pay a heavy price for its continued support of the insurgency. They have not brought Hanoi to the point of negotiating peace terms nor caused a complete demoralization of the North Vietnamese. However, air strikes have caused serious economic dislocations in the North and dramatically illustrated U.S. power and determination - as well as restraint. The cumulative effect of the selective bombing of North Vietnam targets cannot be currently assessed, but it will probably have considerable impact on communist plans for the future conduct of the war. The ROLLING THUNDER program unquestionably has had a salutary effect on the morale of our South Vietnamese allies.

These accomplishments are especially noteworthy when viewed against

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the numerous political restraints which have hindered the effective employment of air power. The unique experience gained from the ROLLING THUNDER program is expected to make a valuable contribution to U.S. strategic air plans and policies.

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INTRODUCTION

Planning for air strikes against North Vietnam began in June 1964 when the JCS asked CINCPAC to prepare targets in North Vietnam for air strikes. Following attacks on two Seventh Fleet destroyers in the Gulf of Tonkin, in August 1964, U.S. Navy aircraft attacked five naval bases in North Vietnam. Following this incident, a sizable deployment of air units to Southeast Asia and other Pacific bases was carried out. No retaliatory strikes were made subsequent to the mortar shelling of Bien Hoa in November or the Brink BOQ bombing of December 1964 but, by that time, planning for NVN strikes was quite advanced, with units earmarked and readied for such strikes. The Viet Cong attacks against American installations at Pleiku and an enlisted men's billet in Qui Nhon in February 1965 resulted in U.S. retaliatory strikes against the North. The FLAMING DART reprisal strikes were followed by a program of systematic attacks on North Vietnamese targets. Known as ROLLING THUNDER, these strikes began in March and details of the operations for the first half of 1965 are contained in CHECO Report, "ROLLING THUNDER; March-June 1965."

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ROLLING THUNDER

CHAPTER I - OPERATIONS, JULY-DECEMBER 1965

During the first week of July, air strikes pushed further north as the targets remaining below 20° were being struck. Armed reconnaissance missions were being directed against lines of communication. Although attention was drawn to the increasing numbers of AA sites, which had succeeded in bringing down two F-105's and damaging six other aircraft, there was a continuing interest in the enemy SA-2 activities. Five of these SAM sites had been discovered, although none were occupied. With the steadily dwindling number of profitable targets outside heavily defended areas, the enemy was re-^{1/}deploying and concentrating AA weapons around the remaining targets.

The USAF and USN were each flying some 1200 sorties per week, while the VNAF averaged about 130. Navy efforts were being directed more and more to armed reconnaissance while USAF operations were, primarily, toward fixed targets. USAF strikes were being flown against inland targets, while the Navy operated in the better-weather coastal area favoring armed recon-^{2/}naissance.

Hostile Air Action

It was at this time that hostile air action was encountered. Although Navy aircraft had met MIG aircraft a few days previously, the USAF "first" occurred on 10 July, when an F4C downed a MIG-17.

By mid-July, of the 117 JCS targets below 20° North, 91 had been

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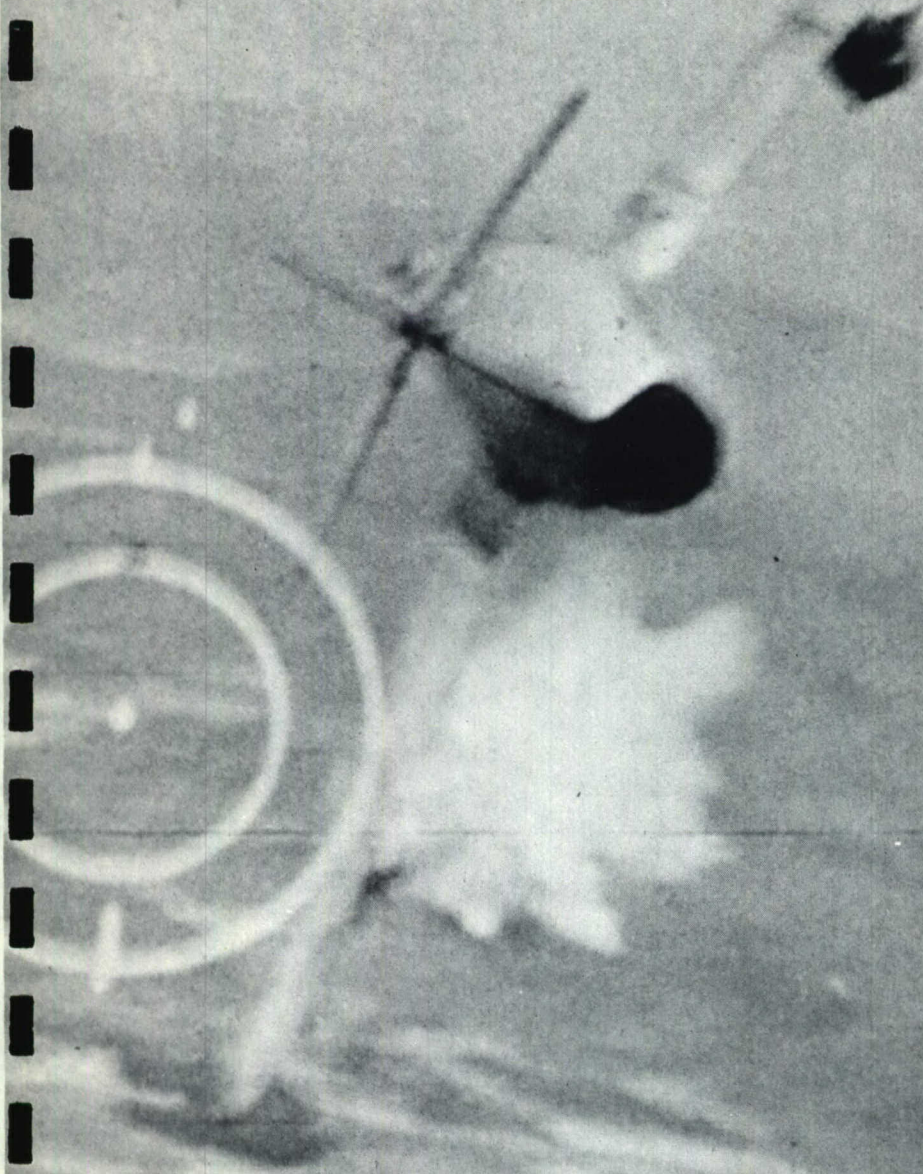
attacked, with all POL storage areas and airfields damaged, 23-24 key bridges destroyed or severely damaged, and 1,151 buildings destroyed. Only 18 of 132 JCS targets above 20° North had been attacked as of 18 July, with strikes against two airfields, one supply depot, one POL storage area, one radar site, two bridges, six ammo depots and five barracks areas. Included were targets 40nm south of the Chicom/NVN border. ^{3/}

SAM Defenses

On 23 July, an RB-66 ELINT (electronic intelligence) aircraft intercepted FAN SONG radar signals, a type employed in the SA-2 guidance system. The location was estimated 23 nautical miles west of Hanoi where there were no previously identified SA-2 installations. Although five of these sites had been located earlier in July, there had been no previous evidence that any were operational. ^{4/}

Pilots preparing for strikes against NVN the following day, 24 July, were briefed on the SA-2 envelope around Hanoi and the signals which had been picked up the previous day. Two flights of four F4C's each (from Ubon) were in the target area flying "high cover" when, at 0850Z, an accompanying RB-66 intercepted FAN SONG signals and flashed a warning. The SA-2 site was estimated as being approximately 20 nautical miles west of Hanoi. Shortly thereafter, a pilot in Leopard Flight observed a missile climbing at an estimated speed of Mach 1, with a climb angle between 65 and 85 degrees. Within seconds it detonated and struck an F4C of the flight. The aircraft disintegrated in a brown-colored fireball, but one

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MIG Under Attack
Fig. 1

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of the other pilots was reasonably sure he had seen two seats eject. Two other missiles were observed to detonate behind the flight; the three remaining pilots took violent evasive action and recovered safely at their bases. 5/

On 28 July, a 54-aircraft strike force was readied for attacks on SAM Sites 6 and 7 (JCS designation), the two suspected of shooting down the F4C. Other targets scheduled for this strike included the Cam Doi and Phu Nieu Barracks, believed to be supporting the SAM sites. Aircraft had been prepared for another mission but were downloaded and refitted with napalm and CBU weapons just prior to take-off. At 0700Z, the planes were over the target. At an altitude of 50 to 100 feet, the aircraft flew, four abreast, through heavy ground fire to deliver CBU's and napalm on the two SAM sites. Six of the 54 aircraft flying the strikes were downed, with one pilot being recovered. The mission commander later reported that the short (two and one-half hours) prior notice had precluded target study. Subsequently, one of the SAM sites was identified as a dummy - possibly intended as a trap; the other (Site 7) was unoccupied, but there was no damage to revetments or associated structures. 6/

According to PACAF Intelligence, the July air strikes created a major transportation problem in parts of NVN. Damage to the Hanoi/Lao Cai rail link left that line inoperative in the Dong Khai area and affected resupply from China. Supplies, however, continued to pour into NVN via the northeast rail line, which had not been struck, and the Port of Haiphong, which was not authorized for air strike. 7/

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While the increasing number of air strikes against NVN was believed by PACAF Intelligence to be inflicting extensive damage below 20° and gradually cutting Hanoi off from the rest of the country, a buildup of NVN defenses against air attack continued. With many major routes being interdicted, the enemy was forced into wide detours and the use of fords, ferries, truck shuttles, human porters, animal pack trains, transshipments and considerable reconstruction. By the end of August, however, 18 confirmed SA-2 sites and 18 suspected SAM areas were reported in NVN, principally around the Hanoi/Haiphong complex. The enemy possessed a total of 4,170 medium and light AW and 6,249 prepared positions. At Phuc Yen Airfield, the NVN had 66 Fagot/Fresco fighters and eight Beagle light bombers. The enemy fighters had not been committed to attacks on U.S. strike aircraft since the 8/ 10 July encounter.

The trend for the USAF, during August, was away from strikes against fixed targets and inclined toward armed reconnaissance missions, with operations continuing to expand northward. Of the 131 JCS targets above 20° North, 28 had been attacked by the end of August. Targets struck in the northern area included: two airfields, two SAM sites, a supply depot, one POL storage site, an island radar site, seven bridges, eight ammo depots, five barracks areas and one thermal power plant. Operations continued outside 9/ the Hanoi/Haiphong prohibited area and well away from the Chicom/NVN border.

Of the 22 JCS targeted bridges south of 20°, 21 had at least one span collapsed. The Thanh Hoa Bridge (JCS #14) still stood, although it was reportedly severely damaged by strikes during each of seven ROLLING THUNDER

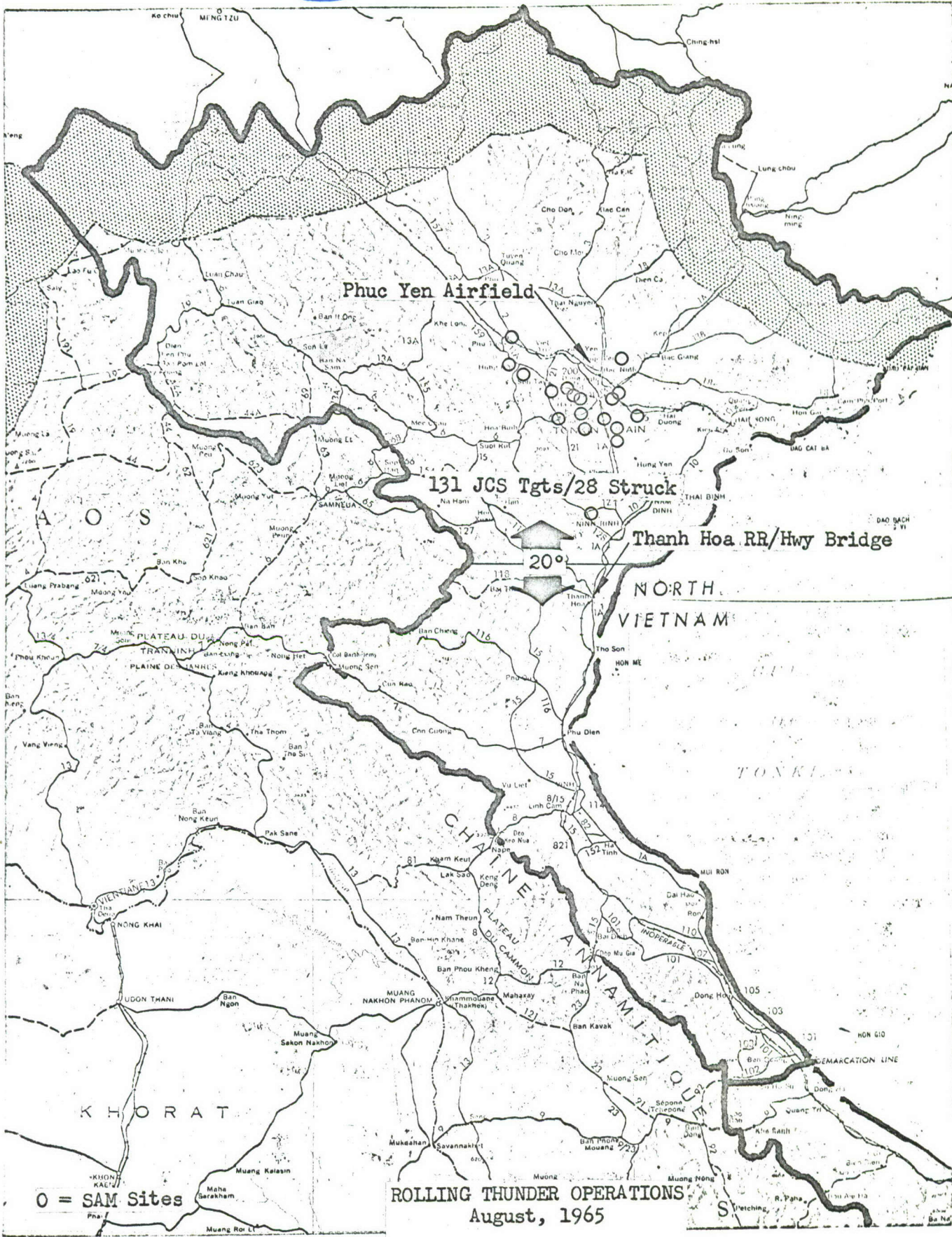


Fig. 3

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cycles. Struck with 3,000-pound bombs during ROLLING THUNDER 24, 25 and 28, PACAF reported "it is now considered 95% destroyed and unserviceable except for pedestrian traffic." However, if true, this was only a temporary condition. Other strikes during the period resulted in the successful interdiction of the northwest rail line to Kunming. 10/

As a result of the SAM threat, a ground-alert posture was established, under the code name of IRON HAND, to respond to ELINT or other reconnaissance information indicating an active SA-2 site. A decrease in effective sorties was noted on 12, 14 and 15 August when this alert force was not launched. Commencing 15 August, however, the alert aircraft struck hard targets and flew armed reconnaissance missions. Little success was experienced with IRON HAND alert aircraft during August. Concern for the SA-2 threat was evidenced by PACAF, who considered it a restraining factor in mission planning and execution, inasmuch as the threat dictated ground-alert posture, ordnance loads, and tactics (low- versus high-altitude) and affected attrition factors. Based on positive intelligence, the mobility tactics in SA-2 deployment were considered the primary reason for lack of success in attacking new sites. 11/

On 9 August, an attack was made by USAF aircraft on SAM Site #9, with tactics differing from those used during the strike of 27 July. Although the site was later determined to be unoccupied, the new tactics were effective in terms of survival against ground fire and in the ability to deliver an effective weight of ordnance. The basic method consisted of three flights of F-105's (two aircraft per flight) armed with napalm and

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CBU's, and attacking at minimum altitude and high speed from widely divergent approach headings, followed by six F-105's delivering 750-pound bombs from a low-altitude "pop-up" attack. The initial low-altitude attacks being concentrated on the missiles and launchers. Attacking forces were backed by MIGCAP, ECM, ELINT and SAR and, despite intense ground fire, only one aircraft received damage. 12/

Three days later (12 August), the Navy lost an A-4 to an SA-2 missile. An intensive effort was made to locate and destroy the site, but without success. Difficulty in acquiring occupied SAM sites hampered efforts of the IRON HAND alert aircraft which continued to fly armed reconnaissance missions. 13/

Despite addition of 3,000 -pound bombs to the USAF inventory, strike planes were carrying more and more CBU and napalm to be used against SA-2 targets. With prospects of a shortage of 750-pound bombs, aircraft were carrying less ordnance. Both factors contributed to the drop in munitions tonnage delivered. 14/

Losses were relatively high during August, with 19 aircraft downed during the last three weeks of the month; nine USAF and 10 Navy. BIG EYE sorties continued in support of attacking aircraft. 15/

During ROLLING THUNDER 30 and 31 (3-16 September) the USAF struck two JCS hard targets and provided the major effort against three other barracks targets assigned the VNAF. Sorties against these targets, plus 610 armed reconnaissance sorties flown in the two-week period, raised the USAF strike

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sortie level to 1,027, the highest achieved during any previous two-week cycle. Efforts to locate and destroy SA-2 sites continued to be a major portion of the effort. On 16 September, two F-105's of a strike force of six seeking an SA-2 site, were lost. The USAF returned to night operations during this period, using the B-57 as a strike aircraft and the C-130 as the navigation and flare ship. The B-57's carried 260-pound fragmentation bombs - 21 per aircraft. Tonnage dropped by USAF aircraft during the period rose 70 percent due to the increased strike effort. ^{16/}

During ROLLING THUNDER 32 and 33 (17-30 September) the USAF struck three JCS-targeted ammunition depots at Yen Son, Tai Xouan and Ban Nuoc Chieu, and made the primary effort against two JCS barracks areas at Hoan Lao and Vinh Linh. The U.S. Navy hit four JCS targets during this cycle. Each being authorized 600 armed reconnaissance sorties, the USAF flew 666 and the Navy 575. The VNAF effort was dropping off, with the Vietnamese flying only 10 of the 2,675 sorties flown during the two-week period. ^{17/}

In the four-week period of 2-30 September, 21 aircraft were lost (11 USAF, eight Navy and two VNAF) but none to SA-2 missiles. On 20 September, a U.S. Navy force of 12 A4's, six A6's, and four F4's were attacked by SA-2 missiles near Kep Airfield. Three missiles were fired at the F4's, which executed a split-S maneuver and evaded. Four more missile contrails were observed by the strike group and they initiated a split-S and hit the deck as the missiles detonated overhead. Later, as the A4's prepared to attack, the strike leader saw two contrails followed by detonations at 1,500-2,000 feet AGL. Two additional contrails were later observed, but no

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detonations were noted due to the evasive action taken. After the attack, two contrails were observed and one missile was seen detonating at about 1,500-2,000 feet AGL. In all, 13 SA-2 missiles were fired, with no hits; one detonating at altitude, the remainder around 800 to 2,000 feet AGL. The estimated "miss" distance from aircraft varied from 1,000 to 5,000 feet, ^{18/} slant range.

By the end of September, it was estimated that 91 percent of the 93 JCS targets south of 20° latitude had been damaged, as were 24 percent of the 125 JCS targets north of 20°. Except for damage to five thermal power plants, no industrial targets had been struck. PACAF believed that judicious selection of a few industrial targets outside the Hanoi/Haiphong complex (such as the Viet Tri Chemical Plant and the Thai Nguyen steel facility), for token attacks, would have beneficial and punitive effects. Intelligence reports from neutral sources in Hanoi indicated the North Vietnamese feared ^{19/} such attacks.

Attacks on Hanoi/Chicom Supply Routes

Planning for ROLLING THUNDER 34 and 35 emphasized not only pressure on NVN but also the long-sought opportunity for cutting vital supply routes between Hanoi and Red China. The USAF had two JCS targets: the Lang Met Highway Bridge and the Lang Het Ammunition Depot. The USN was given the Xom Phuong Highway Bridge and the Vu Chua Railroad Bridge. The USAF targets were attacked on 5 October, with 18 F-105's striking the Lang Met Highway Bridge, knocking the north end down and rendering the bridge unserviceable.

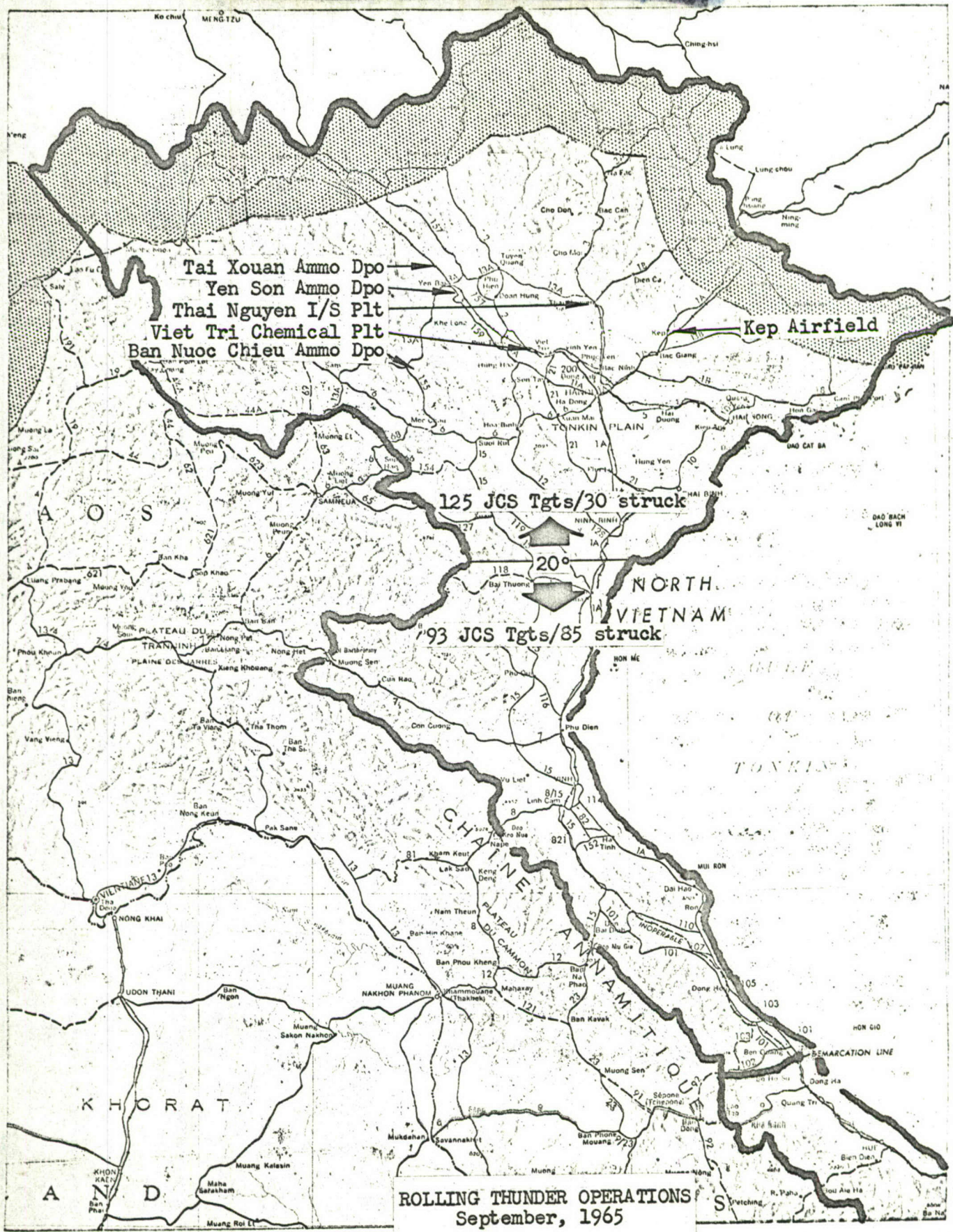


Fig. 4

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Two F-105's were lost during this attack. Eight F4C's struck the Lang Het Ammunition Depot - in the face of heavy ground fire - causing one secondary explosion. An F4C was downed, both pilots ejecting safely but rescue efforts failed. The Navy damaged the southern approach to the Kep Highway Bridge and destroyed the northern half of the Vu Chua Bridge. These targets were located on the northeast rail line connecting Hanoi with Yungning in Red China. 20/

During the ROLLING THUNDER 34 and 35 cycle (1-14 October) the USAF flew 698 armed reconnaissance sorties; Navy 594. Each was authorized 600, but the USAF requested and was assigned an additional 100 for the 10-14 October period. During the latter cycle, 20 USAF aircraft were hit with five lost; Navy received 19 hits, losing three aircraft. The VNAF flew only 10 sorties; experiencing no hits, no losses and no aborts. 21/

Strikes during the cycle were concentrated against JCS targets located above 20° North latitude, with the attacks against the northeast rail line being conducted less than 30nm from the Chicom border. The destruction of 32 JCS targeted bridges, plus over 500 secondary bridges during armed reconnaissance flights, was believed to have seriously disrupted all road traffic south and west of Hanoi, particularly during the rainy season. During the dry season, when streams could be forded, many LOC interdiction points could be bypassed. PACAF believed there was a decrease in the flow of supplies to enemy units in Laos and the RVN, reducing the enemy capability of massing units to launch large scale offensives. 22/

In the period 15-28 October, ROLLING THUNDER 36 and 37 continued


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emphasis on the armed reconnaissance program and interdiction of the Hanoi/Red China supply routes. The USAF was assigned the Bac Can Highway Bridge and the Choi Moi Highway Bridge, plus the Phu Van Army Barracks originally assigned the VNAF. Navy was authorized strikes against the Thai Nguyen and Lang Luong Highway Bridges. The USAF attack on the Bac Can Highway Bridge was made 17 October, in coordination with Navy strikes on their targets. Sixteen F-105's dropped 32 3,000-pound bombs, cratering the south approach and putting two large holes in the bridge deck. While the USAF lost no aircraft, the Navy lost three. The Choi Moi Highway Bridge was struck on 20 October. Fifteen F-105's and 11 flak suppression aircraft flew the mission, dropping two spans. No aircraft were lost or damaged. ^{23/}

In addition to strikes against the JCS targets, the USAF flew 603 armed reconnaissance missions (Navy, 584) during the 15-28 October period. The total of 1,380 sorties represented a slight drop from the 1,454 of the previous cycle. ^{24/}

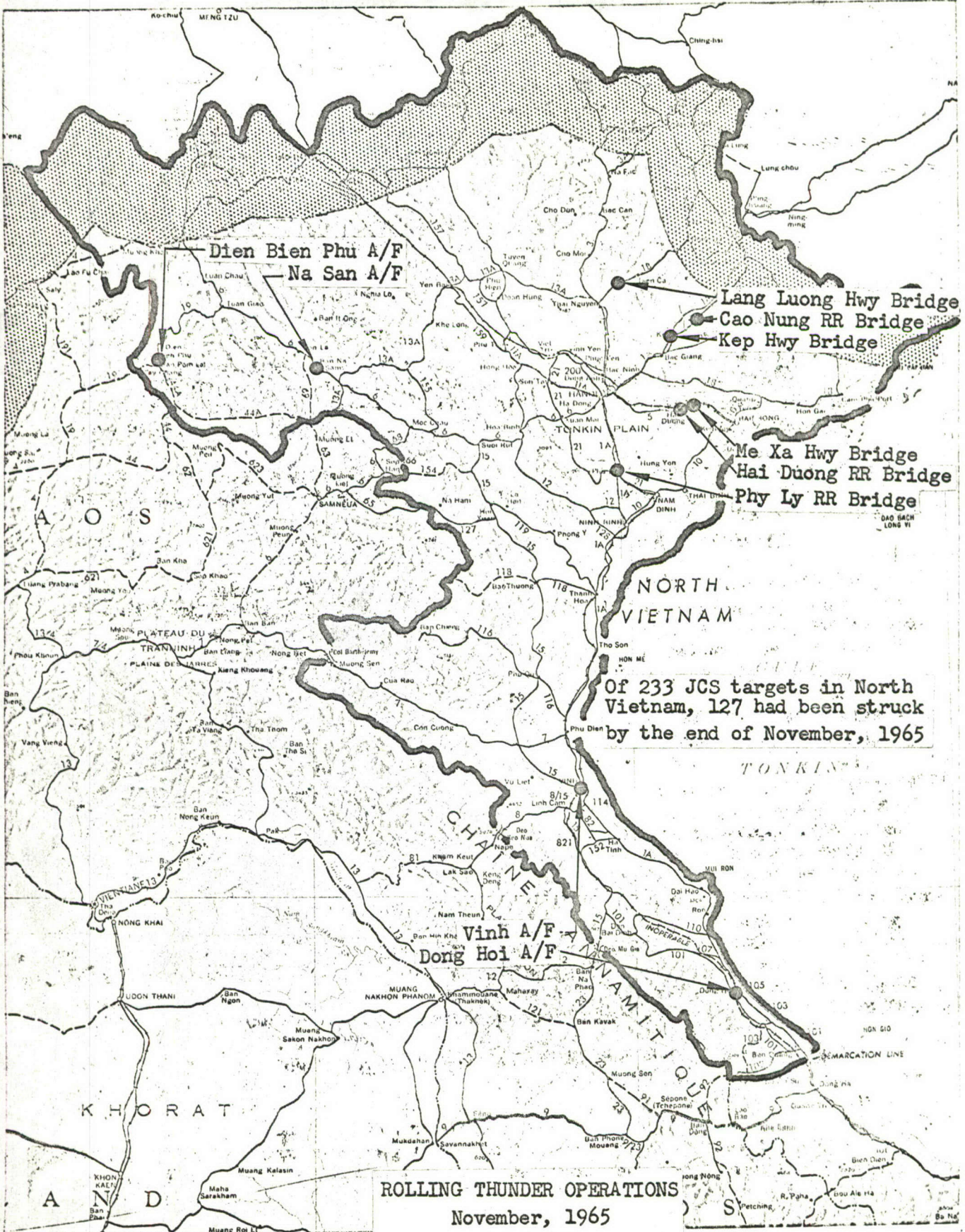
ROLLING THUNDER 38 and 39, in the period 29 October-11 November, authorized six strikes against JCS targets. The USAF was assigned the Phu Ly RR Bridge and the Dong Em SAM Support Facility; the Navy was given the Hai Duong RR/Highway Bridge, Me Xa Highway Bridge and the Lang Luong Highway Bridge, with the Kep Highway Bridge as an alternate. A VNAF-assigned target, Vinh Linh Barracks was not struck as the damage level from previous strikes was considered adequate. The USAF struck both its targets on 7 November, dropping two spans of the Phu Ly RR Bridge and damaging 22 buildings of the Dong Em SAM Support Facility. Navy struck the Kep Highway Bridge on 31

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Strike Against Hanoi-Lao Kay Rail & Road LOC
Fig. 6

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ROLLING THUNDER OPERATIONS
November, 1965
Fig. 7

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October, with all spans reported off their piers and in the water. On 5 November the Hai Duong Highway Bridge was struck by Navy with damage reported to the east span. On 8 November, moderate damage was inflicted on the Me Xa Highway Bridge. ^{25/}

The USAF also flew 635 armed reconnaissance missions during the two-week period, as compared to 576 for Navy. Sixteen IRON HAND strikes were flown; another 145 IRON HAND sorties being diverted to armed reconnaissance or cancelled. The USAF lost two F-105's; one to AA, one to SA-2. During rescue efforts for the aircraft lost to the SA-2, two USAF A-1E's, one USAF CH-3C and a Navy SH-3 were shot down. The USAF also lost an RF-101 during the period. Navy lost four aircraft; two against JCS targets, one on armed reconnaissance and one while attacking a bridge in NVN upon returning to the carrier from a STEEL TIGER mission. ^{26/}

Successful attacks were made against SAM sites during November. On the 7th, four F4C's struck SAM Site C18 at 203215N 1055446E. Sixteen 750-pound bombs were dropped in the revetted area of the site and the radar was believed destroyed. The same day, four other F4C's struck SAM Site B22 at 204555N 1053800E, dive-bombing against medium to heavy flak and dropping 22 750-pound bombs on target. It was uncertain as to whether the site was occupied but no missiles were launched. ^{27/}

On 5 November, F-105's in the vicinity of 2025N 10553E observed missiles fired toward them, one detonating at 13,000 feet, the other at 7,000. Another flight of F-105's (Oak Flight) reported a missile detonating within

[REDACTED]

50 feet of Oak-1, with two others detonating 3,000 to 12,000 feet away. Oak-1 was reported down shortly thereafter. ^{28/}

On 31 October, a Navy strike force sighted a total of 13 SA-2 missiles in flight between 0230Z and 0240Z. No aircraft were hit although 24 of them were within SAM range. This was attributed to the immediate evasive action taken following alert warnings from ELINT aircraft or as a result of visual sighting by other pilots. During the 31 October strike against the Kep Highway Bridge, Navy pilots were attacked by seven SA-2 missiles but were successful in evading. One missile tracked an aircraft flying at 700-800 feet; the aircraft turned 90 degrees to the missile, which turned directly toward the aircraft. The aircraft turned again, putting a karst ridge between itself and the missile site. The missile impacted the ground less than a mile from the aircraft. ^{29/}

Navy A4E aircraft, on 5 November, scored direct hits on a missile launcher near 205230N 1062330E. Secondary flaming explosions and extensive brown smoke were observed in the launcher area. Two SAM's were launched during this mission, detonating at about 18,000 feet and five miles from a flight of F-8E's. On 8 November, Navy A4E's struck a new SAM installation at 205600N 1065030E, reporting two strings of bombs crossing the middle of the installation, with rockets hitting missiles on launchers. Another A4E struck Haiphong SAM Site B01, which was occupied. ^{30/}

For ROLLING THUNDER 40 and 41 (12-25 November) the USAF was assigned two targets: the Cao Nung Railroad Bridge and the Lang Luong Highway Bridge.

[REDACTED]

Sixteen F-105's struck the Lang Luong Bridge on 16 November, cratering the west approach and ford, but failed to drop a span. Twenty F-105's damaged the southwest end of the Cao Nung Bridge but the bridge was left serviceable. The Navy struck the Hai Duong RR/Highway Bridge, cutting the rail line and causing structural damage to the east span, rendering the bridge unserviceable. On 25 November, Navy aircraft struck the Me Xa Highway Bridge, again, with numerous hits on the east end of the bridge and approach. MIG's attacked the strike aircraft and were engaged by A4's. One Navy aircraft was damaged. No AA fire was observed in the target area during the MIG attack, indicating the NVN ability to coordinate air defense efforts. It also revealed a low-altitude engagement tactic which rendered BIG EYE hi-cover radar in-effective. ^{31/}

On 22 November, USAF launched two successful IRON HAND strikes. On one, four F-105's (using terrain masking at minimum altitude), in line-abreast formation, "popped-up" 10 miles from the targets, selected one of two sites visible and struck with rockets at 5,500 feet and 450 knots. No flak was encountered on the run-in and the site was left burning as the result of a large secondary explosion. In the other attack, three of four F-105's (one aborted) used "pop-up" tactics and again achieved surprise - encountering flak only when leaving the target area. One F-105 was lost during the period 12-25 November to a SAM missile. ^{32/}

Increased MIG activity was noted. On 15 November, two RF-101's northwest of Hanoi were attacked by two MIG-type aircraft. Both successfully eluded the enemy planes. The following day, two RF-101's on a BDA mission

[REDACTED]

sighted two MIG's northeast of Hanoi and dropped into clouds to evade them. ^{33/}

During the two-week cycle, USAF flew 108 night strike sorties (15 percent of strike effort), while Navy flew 214 (33 percent of effort). The total U.S. effort during the period declined slightly, due principally to problems in moving Navy carriers during bad weather. A total of 1,280 combat sorties were flown; 176 cancelled due to weather. Of the 157 JCS targets outside restricted areas, all but 33 were attacked as of 25 November. PACAF recommendations for strikes against the Thai Nguyen Iron and Steel Combine (JCS #76), Kep Airfield (JCS #9.1), and Kep Ha Airfield (JCS #9.11), had not been approved, nor had additional strikes against dams and locks been programmed. Airfields at Vinh, Dong Hoi, Na San and Dien Bien Phu were kept neutralized, with enemy AOB remaining intact at major airfields near Hanoi and Haiphong. ^{34/}

On 23 November, JCS issued an execute order pertaining to ROLLING THUNDER 42 and 43. The period of this order covered 26 November-9 December and listed a number of targets for attack; it also defined the U.S. armed reconnaissance area for the cycle. The order stated that the objective of armed reconnaissance was to sustain, for maximum feasible periods, day and night interdiction of LOC's, through surveillance and destruction of military targets encountered. The JCS authorized recipients of the order to include attacks on pre-briefed, small military targets, followed by route recce. JCS targets, within the armed recce area and previously assigned to ROLLING THUNDER strikes (excluding locks, dams and that portion of JCS #52 which was formerly JCS #38) were authorized targets. Strikes on such targets

to be identified and reported daily (to include number of attacking sorties, objectives of coastal armed recce including destruction of recognized NVN or other aircraft and/or surface craft which fire upon our aircraft along the NVN coast, in estuaries and mooring areas, and in the vicinity of coastal islands). The planned number of strike sorties were limited to a maximum of 1,200 for the 14-day period. CINCPAC was authorized to launch special sorties beyond this limit, if necessary to destroy SAM installations, trucks, rail rolling stock or NVN naval craft, and beyond the capabilities of planned armed reconnaissance sorties. ^{35/}

Recognized military targets of opportunity in vicinity of target areas, and crafts or units which fired upon aircraft en route to or from missions, would be destroyed. However, targets of opportunity situated outside the armed recce area were not to be struck if within 25nm of the China border, 30nm of the center of Hanoi or 10nm of the center of Haiphong. Aircraft (including BARREL ROLL and STEEL TIGER aircraft overflying NVN) returning from missions could attack previously struck JCS targets (except locks, dams, and that portion of JCS #52 which was formerly #38) which lay in the armed recce area and which were suitable as jettison areas. Returning aircraft overflying Laos were authorized to attack RLAFF targeted road segments in Laos. ^{36/}

The JCS defined damage objectives as that amount of damage which neutralizes or renders the target ineffective and/or unable to perform its function. This damage objective in the case of those targets selected for U.S. strikes was, for each target, to be achieved in a single, coordinated

[REDACTED]

strike effort, although the targets need not be struck simultaneously. The JCS also authorized pre-strike, concurrent and post-strike reconnaissance. Commanders were told to avoid striking populated areas in attack of any targets, including those developed by armed route recce. MIGCAP and screen aircraft, and other appropriate elements of the forces were directed to engage in combat, including SAM-suppression when required to protect the strike forces. When engaged in immediate pursuit, in connection with protection for strike forces, U.S. forces were not authorized to attack NVN air bases from which attacking aircraft were operating. ^{37/}

The JCS directed CINCPAC to plan strikes and armed recce missions so that flight paths of U.S. aircraft did not approach closer than 20 nautical miles of the China border. ^{38/}

In conclusion, CINCPAC was authorized to assign alternate missions to BARREL ROLL and STEEL TIGER in the ROLLING THUNDER area, as appropriate. ^{39/}

For ROLLING THUNDER 42 and 43, the USAF was authorized to strike Dong Em SAM Support Facility, Cao Nung Railroad Bridge (JCS 18.24), and the Lang Luong Highway Bridge (JCS 18.62). The Dong Em target was struck on 27 November with one hundred and fourteen 750-pound bombs and eight 3,000-pound bombs, damaging four buildings and destroying eight, raising the damage level on this target by 15 percent. The Cao Nung Railroad Bridge was struck on 1 December and all three spans of the bridge were dropped, although one F-105 was lost due to intense flak and three SAM missiles were sighted during the attack. The Lang Luong Highway Bridge was scheduled for attack on five separate days, with 20 aircraft ready each day; however, weather forced

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cancellation. ^{40/}

The Navy struck the Ha Chanh Bridge (JCS 18.76) on 28 November, using Bullpups and 1,000- and 2,000-pound bombs. The center span was dropped and the southern span damaged. No enemy reaction was experienced. On 1 December, the Navy hit the Hai Duong RR and Highway Bridge (JCS 18.25) damaging the bridge with one Bullpup. Pilots reported the western truss of the bridge to be spread and distorted. AA fire was heavy and SAM's were fired. The VNAF, on 3 December, struck the Giap Rong Barracks (JCS 39.47) with seven aircraft, reporting all bombs on target but no available BDA. ^{41/}

Against a quota of 600 armed recce sorties, the USAF flew 601; the Navy flew 433 of its quota of 600. Poor weather, which affected target areas and resulted in high seas hampering launch and recovery from carriers, was responsible for the Navy underflying its quota. ^{42/}

One F-105 was lost by the Air Force in the attack on the Cao Nung Railroad Bridge, another on armed reconnaissance. A third was lost when the aircraft flamed-out after take-off. ^{43/}

In the final two weeks of 1965, before the bombing pause on 24 December, pressure was maintained against North Vietnam through destruction of targets of military significance and continuing interdiction of LOC's. The objective was to continue to increase the cost and difficulties to the NVN in supporting its insurgencies in Southeast Asia. In addition to four strikes against bridges (as part of ROLLING THUNDER 44 and 45), the JCS authorized strikes against Uong Bi Thermal Power Plant, which was planned for the previous

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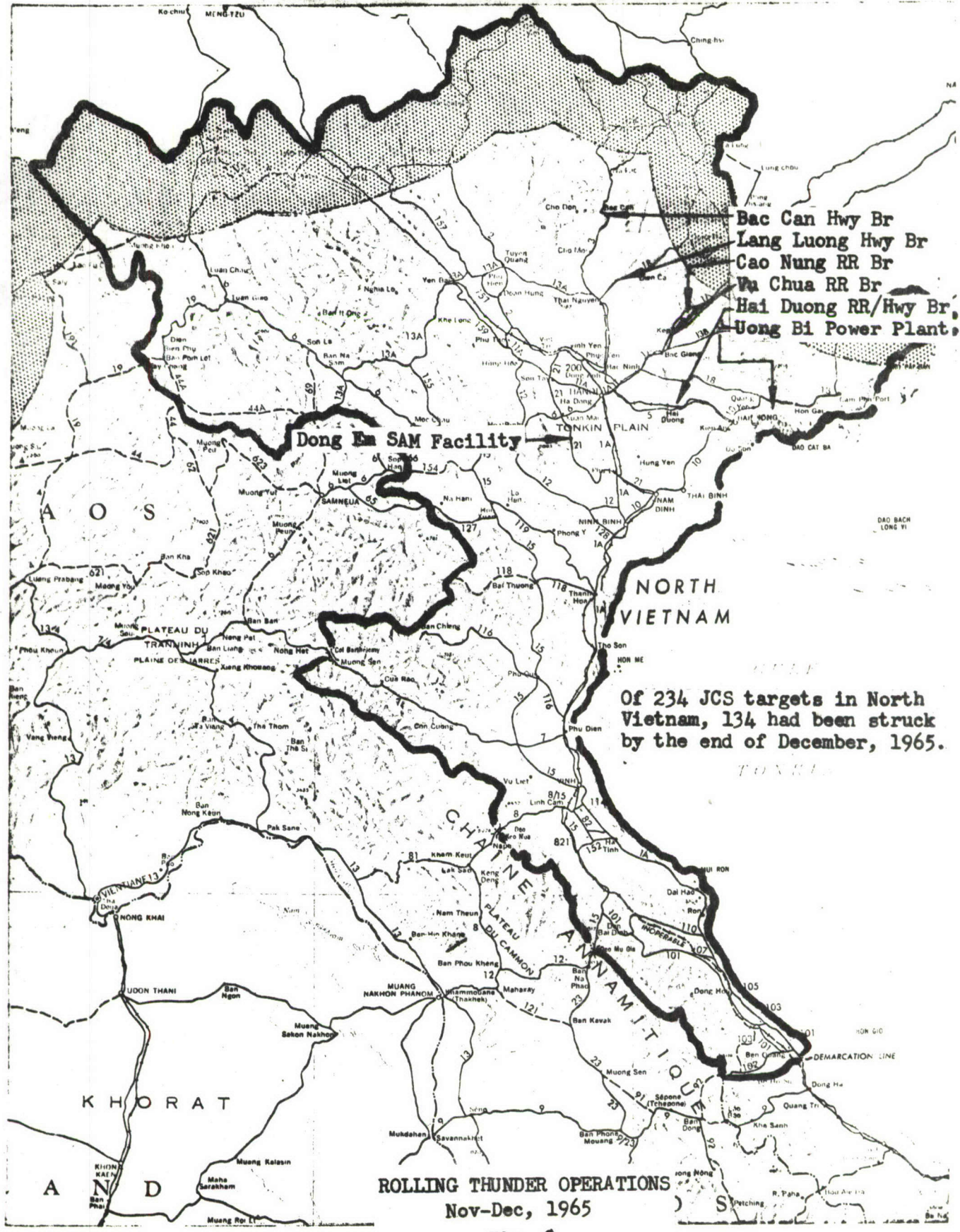
cycle but cancelled due to weather. ^{44/}

The Uong Bi Thermal Power Plant was one of the largest plants in NVN, producing about 14 percent of the nation's total capacity of 176,000 kilowatts. The bulk of its power production went to Hanoi and Haiphong (supplying one-fourth of Hanoi's power consumption and one-third of Haiphong's) and had been scheduled for expansion at the end of 1965. Strikes were scheduled by the Air Force on five consecutive days. Finally, on the fifth day (15 December), seven of 28 strike and flak suppression aircraft struck the plant. Although transmission lines were cut, the plant was not put out of operation. One F-105 was lost on the mission. ^{45/}

The USAF also struck the Bac Can Highway Bridge (JCS 18.61), on 19 December, after scheduling attacks for four consecutive days. Fifty-four 750-pound bombs were dropped on the bridge. Pilots reported two spans down, with extensive damage to the remainder of the bridge and adjacent areas. One aircraft was disabled by a SAM on the strike, but both pilots ejected and were rescued. Two missiles were fired. ^{46/}

Another JCS target strike against the Vu Chua Railroad Bridge (JCS 18.74) was flown on 20 December but reports indicated the bridge serviceable. On this mission, one F-105, one F-100 Wild Weasel aircraft, and one F4C were shot down. The F4C was hit by a SAM; both pilots ejected and were picked up. The other two aircraft were downed by AA fire. ^{47/}

The Navy made a night strike on the Uong Bi Thermal Power Plant on 20 December. Six A6A's dropped 2,000-pound bombs by radar, but no additional



damage was reported. On 22 December, the Navy struck again with three waves of aircraft (44 A4's, 11 F4's, and ten F8's) this time damaging the boiler house and rendering the plant unserviceable. Two A4's were shot down. Navy also hit the Hai Duong Railroad Bridge (JCS 11) on 22 December, with minor damage inflicted, in conjunction with the attack on the Uong Bi Plant. In this strike an A6A and RA-5 were lost to SAM's. On 23 December, ^{48/} the Navy struck the bridge again, this time leaving it unserviceable.

The Air Force flew 584 of its authorized 600 armed recce sorties while the Navy flew 414 sorties of their 600 quota. A USAF F-105 was lost on an armed recce mission. On an IRON HAND mission, flown on the 22d of December, an SA-2 site was located and attacked with excellent results. MIG activity was stepped up during this period with F-105's and F4's making visual sightings and noting indications of intended attacks against BIG EYE aircraft. ^{49/}

Only one day of strike operations was conducted during the ROLLING THUNDER 46 and 47 period (24 December 1965 through 6 January 1966). Following 91 USAF/USN strike sorties on 24 December, the "bombing pause" was initiated. Reconnaissance of NVN was continued throughout the period. ^{50/}

The Bombing "Pause"

When the "bombing pause" was begun on 24 December, CINCPAC reported that all major LOC's were open and being used extensively by truck traffic. The rail line from Hanoi to Lao Cai was also open. CINCPAC was concerned

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that, despite 1,200 armed recce sorties flown each ROLLING THUNDER period, the LOC's remained usable. There were indications that 80 percent of enemy movement was by night. CINCPAC desired a maximum effort to identify and strike the most vulnerable points of the LOC's. However, there was a need for extensive photographic coverage of southern NVN (from Vinh to the DMZ) to locate secondary routes and bypasses for major routes. As this could best be accomplished by mosaic photography, 2AD was requested to examine the feasibility of acquiring such photography by using RF-4C's equipped with KA-55 cameras. There was also a requirement for better night coverage along the LOC's to identify traffic bottlenecks which could be exploited. ^{51/}

CINCPACAF realized that weather and other factors affected armed reconnaissance operations but said it was imperative a capability be developed to locate and concentrate efforts on the most vulnerable areas along LOC's. "You may expect continuing high level concern with this problem from here on out," CINCPACAF advised the 2AD Commander on 25 December. ^{52/}

Summary

At the end of the year, after some eleven months of ROLLING THUNDER operations, it was evident the program had not achieved its objective of pressuring Hanoi into halting support of insurgency in South Vietnam and Laos. It did, however, affect the economy of North Vietnam with indications of weakening the economic base. ^{53/}

Indications pointed to a prolonged struggle, since Hanoi's attitude did not change as a result of ROLLING THUNDER nor was the NVN morale

significantly shaken to produce a change. ^{54/}

CINCPAC, in evaluating the overall effectiveness of ROLLING THUNDER, stated there had been significant disruptions on which the US/FWMAF could capitalize, if operations were to be resumed after the stand-down. NVN had been forced to expend great efforts to repair roads and bridges and to prepare defenses of urban areas against possible attack. Necessary internal operations had been severely disrupted and military support for the Viet Cong/Pathet Lao had been slowed, but not significantly. Reconstruction of communications links was designated as a primary strategic problem and numerous NVN citizens were organized into repair gangs. The NVA had been given supervision of reconstruction in damaged areas, which no doubt detracted from military duties. As a reflection of those pressures, the NVN news agency in Hanoi increased the tempo of propaganda relating to U.S. air strikes. These facts and others indicated that Hanoi felt the pressure and that US/RVN were aware the NVN government was faced with growing internal problems. ^{55/}

In light of the limited objectives of the air campaign over NVN, CINCPAC continued, ROLLING THUNDER had done quite well. On the other hand, ROLLING THUNDER operations had not been conducted in a manner sufficient to increase the pressure on Hanoi in late 1965. Targets vital to effective military operations had not been struck in significant numbers. Enemy military and civilian activities had accommodated to limited operations. In fact, the psychological pressure had decreased but, regardless of how ROLLING

THUNDER had been conducted, the important fact was that the nature of the war had changed since the NVN air campaign began. ROLLING THUNDER had not forced Hanoi to the decision the U.S. had sought. There was now every indication that Ho Chi Minh intended to continue support of the Viet Cong until denied the capability to do so. He had the political-economic support of the Chicoms which increased his obligation to that regime. This, with pressure from that direction to continue support, probably left him little alternative. This resolve had caused a significant change in the complexion of NVN support to the Viet Cong. With this final conclusion, ^{56/} CINCPAC recommended resumption of the program.

In late December, CINCPAC recommended that RT 48/49, during the period 7 January-20 January, place gradual but systematic pressure on NVN, by beginning the closure of the seaward supply LOC, selected attacks against other high value targets (such as POL and power) and shrinkage of the prohibited areas around Hanoi and Haiphong. He recommended that the prohibited areas around Hanoi be reduced to 25nm, and Haiphong 8nm, and that the armed recce boundary run south from the Chicom buffer zone, tangent to the southern edge of the Haiphong circle. He noted that this action would open up several key LOC targets to armed recce surveillance and attack. Additionally the NE LOC's, on which only occasional Alpha strikes had been accomplished, were recommended by him for armed recce surveillance between the CHICOM buffer zone and the Hanoi/Haiphong prohibited areas in order to maintain the damage levels and interdiction initially achieved. Relating to recent additional authority granted against NVN naval craft, he recommended

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ROLLING THUNDER RESULTS

North Vietnam, 1965

		Trans Vehcls	Buildings	Bridges	Road Cuts	Rail Cuts	Ferry Slips	Runways	AA Sites	SAM Sites	Radar Sites	POL Tanks	Power Plants	Locks/Dams
April	DEST	49	41	16	0	0	1	0	4	0	1	0	1	0
	DMGD	67	19	12	15	0	2	0	3	0	4	0	0	1
May	DEST	34	167	5	0	0	0	0	7	0	2	0	0	0
	DMGD	42	182	60	2	1	0	0	16	0	4	1	0	0
June	DEST	71	408	27	0	0	3	0	23	0	4	0	1	0
	DMGD	84	444	79	24	4	21	2	19	0	13	2	0	1
July	DEST	94	311	28	0	0	5	0	3	0	0	0	0	0
	DMGD	250	395	73	30	7	15	2	4	1	8	0	0	0
August	DEST	37	331	32	0	0	1	0	5	0	1	0	1	1
	DMGD	42	397	101	66	6	3	2	4	1	6	1	1	2
September	DEST	57	499	32	0	0	2	0	5	0	0	0	0	1
	DMGD	98	503	124	112	15	13	1	0	0	4	0	1	3
October	DEST	48	232	43	0	0	2	0	6	0	1	0	0	0
	DMGD	22	201	106	160	51	3	1	2	1	1	0	0	0
November	DEST	46	200	38	0	0	1	0	3	2	1	0	0	0
	DMGD	88	201	47	219	8	6	3	5	1	1	1	0	0
December	DEST	41	150	25	0	0	0	0	4	3	0	0	0	0
	DMGD	47	174	54	219	0	13	2	2	2	0	1	0	0
TOTALS	DEST	477	2339	246	0	0	15	0	60	5	10	0	3	2
	DMGD	740	2516	656	847	92	76	13	55	6	41	6	2	7

Fig. 9

that attacks be authorized to within 20nm of the Chicom border in order to include naval craft operating out of Port Wallut. ^{57/}

USAF/USN pilots were responsible for the great majority of combat sorties flown during 1965, including strikes, flak suppression, armed reconnaissance, combat air patrol and rescue activities. As of 23 December 1965, just prior to the "pause", the record was as follows: ^{58/}

	<u>Total Sorties</u>	<u>Strike Sorties</u>	<u>Aircraft Lost</u>	<u>Aircraft Damaged</u>
USAF	25,971	10,975	80	189
USN	28,168	11,656	83	250
VNAF	652	563	8	11
Totals	54,791	23,194	171	450

The ROLLING THUNDER program had been expanded to cover most of North Vietnam, but at the end of the year there was still no approval to carry out COMUSMACV's recommendations that B-52's be used to strike remote areas and that Haiphong Harbor be mined; nor was permission given to strike the air bases in the Hanoi/Haiphong complex harboring jet aircraft.

Prior to the 24 December-30 January stand-down of air operations against North Vietnam, CINCPAC had advised the JCS that without increasing pressure in the ROLLING THUNDER program beyond the 1965 level, the program would not accomplish its purpose. He voiced concern over the pause in air strikes and completely concurred with COMUSMACV's comment that "from a military standpoint, no advantages accrued whatsoever in a cease-fire affecting RVN." COMUSMACV recommended immediate resumption of offensive air operations. ^{59/}

CHAPTER II - OPERATIONS, JANUARY-JUNE 1966

Concept of Operations

A concept for the conduct of air attacks against North Vietnam, under the ROLLING THUNDER program was developed at the Honolulu Conference, held 17-31 January 1966. At that time, it was felt that the objectives could be achieved with available forces, providing those forces were utilized in accordance with that concept. ^{1/}

The overall objective of the air campaign was to reduce, to the maximum extent feasible, NVN's capability to support and direct the insurgency in SEA. The attainment of this objective required the expenditure of combat air sorties at a controlled weight of effort in the performance of three tasks:

- a. Reduce/restrict NVN assistance from external sources.
- b. Destroy in depth those resources already in NVN contributing most to the support of aggression; destroy or deny use of all known permanent military facilities; and harass and disrupt dispersed military operations.
- c. Harass, disrupt and impede movement of men and materials through southern NVN into Laos and SVN.

The operational concept involved application of a relatively constant number of strike sorties against selective and sensitive target systems - the weight of effort to be applied to the three basic tasks, carefully balanced, to achieve the most effective results from the sorties expended.

The sortie generation rates were based on USAF tactical fighter squadrons, with 18 aircraft per squadron flying at the rate of .8 sorties/day/aircraft. This rate provided for 432 combat sorties per month for each squadron, including: strike, armed reconnaissance, flak suppression, combat air patrol and rescue combat air patrol sorties.

The three tasks were interrelated and had to be accomplished simultaneously for maximum effective results. While it was recognized that certain operations would be more productive than others, concentration on any one at the expense of the others would reduce the overall effectiveness of air operations. ^{2/}

It was felt that the greatest impact on NVN would be the reduction of support from external sources and destruction of in-country, hi-value resources. Armed reconnaissance, while less productive destruction-wise, was essential to keeping the lines of supply constantly disrupted and harassed to impede movement. The large land mass and extensive network of the LOC's would require considerable sortie expenditure to cover all elements of the LOC system which the enemy was using. However, by concentrating available armed reconnaissance against selected elements of the enemy LOC system and his dispersed and hidden support facilities, it was believed increasingly effective results could be expected. ^{3/}

The reduction of external support would require interdiction of water and land LOC's used to receive, distribute and transport war-making material from external sources. The interdiction effort would be a combination

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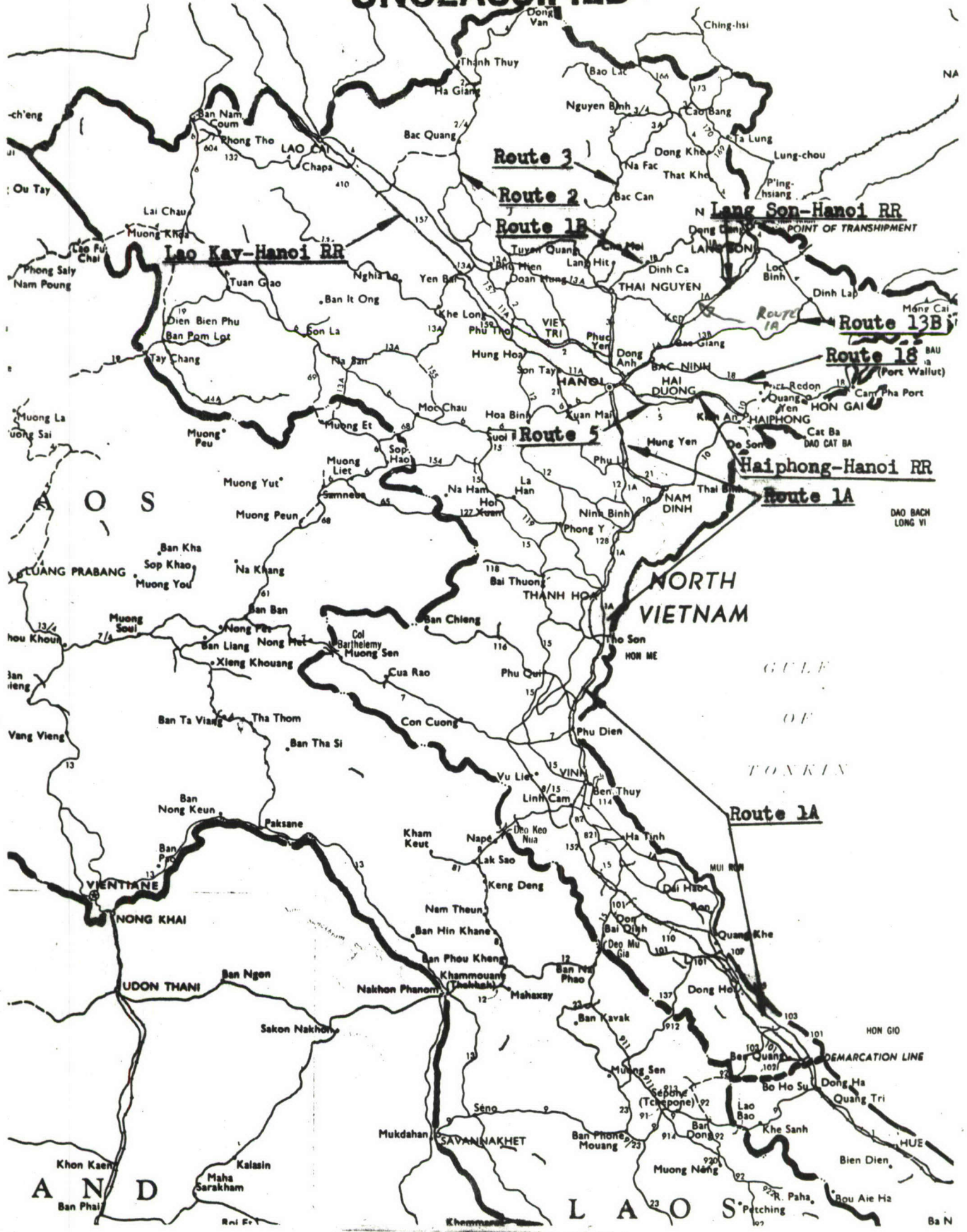
of attacks against the major port facilities and key bridges and the northern LOC's, combined with armed reconnaissance to disrupt, harass, and impede enemy movement. In addition, armed reconnaissance along these LOC's would destroy dispersed and hidden support facilities, such as POL and military supply. ^{4/}

The harbors and ports of Haiphong, Hon Gay, and Cam Pha were the primary water LOC's. Reducing the flow of external support through these ports (67 percent of the total) could be accomplished by the destruction of the port handling facilities, mining the approaches, or a combination of both. ^{5/}

In the northern area there were two primary rail lines which provided additional external support - Lang Son to Hanoi and Lao Kay to Hanoi. These could be cut effectively by attacks on the key bridges. There were also eight LOC's -- Routes 2, 3, 1A, 1B, 13B, 18, and 5 and a rail line parallel to Route 5 -- which connected Haiphong and Hanoi. There were 15 key bridges that had to be kept in an unserviceable state to cut all of these LOC's. An initial effort averaging 25 strike sorties per bridge would probably accomplish the desired destruction. It was thought this level of effort would be required on a monthly basis in order to destroy new construction and prevent use of new routes. Six armed recce sorties per day on eight of the northern LOC's would be needed to harass reconstruction, destroy traffic bottle-necked by the cuts, and seek out and destroy traffic moving along bypass routes. The initial strikes on a monthly basis and the daily armed recce would provide an 85 percent probability of keeping at least two bridges interdicted on each route. The overall monthly average would be

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PRIMARY RAIL & ROAD LOC'S

Fig. 10

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60/DAY
approximately 1,815 strike sorties. As a result, train and truck traffic from China to the Hanoi-Haiphong area and between Haiphong and Hanoi would be disrupted and harassed. Import of material would be substantially reduced, as would export of items to China. North Vietnam would be compelled to divert an ever-increasing weight of effort to repair and maintain a serviceable LOC system. Movement of critically required supplies and support would be slowed, causing Hanoi an increasing internal management problem, which would eventually detract from its ability to support external aggression. 6/

The destruction or denial of the NVN war-supporting capability required the attack against POL systems, power plants and the remaining military facilities. 7/

The conferees believed that the initial priority of effort on NVN's war-supporting capability should be directed against major POL facilities and power plants. The nine major POL facilities would require an average of 45 strike sorties per target, or 405 total strikes. There were approximately 10 additional known dispersed POL storage areas which could be pre-briefed priority targets for armed recce. The destruction of POL supplies could be achieved with a relatively low sortie rate, which it was believed would have a greater impact on NVN ability to move men and materials than any other effort. All elements of the NVN transportation system which required fuel and lubricants would be immediately affected (and restricted.) 8/

It was estimated that the six major thermal power plants would require an average of 16 sorties per target, or 96 total strike sorties. The destruction of all the power facilities would have an immediate impact on the entire NVN military, transportation, and industrial base, and would further disrupt and harass the enemy's support capabilities. ^{9/}

The aim of the armed reconnaissance program in the southern area of NVN was to impede, disrupt and harass the movement of personnel and logistics supporting the insurgency effort. This required the highest expenditure of combat strike sorties. However, the effort produced less lucrative results in terms of destruction of war-making resources. It was felt, however, that it was a vital task which had to be performed as an integral part of the air campaign. The extensive land and water LOC's required a discriminate and continuing analysis of movement capabilities and patterns. The dynamic and fluid pattern of movement was difficult to determine; as one route became difficult to traverse, alternate routes and trails would be used by the enemy. As one means of transport became difficult to use, another would be substituted. There had been a persistent and increasing effort expended by NVN to repair the LOC's and to improvise means of continuing the flow of materials. Armed reconnaissance could not stop the flow but, if properly applied, it would make it costly and difficult to effect the movement of personnel and material. The weight of effort expended and the targets selected for destruction would determine the degree of effectiveness to be achieved. There was, however, a point of diminishing returns. The weight of effort, therefore, had to be carefully balanced

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against other facets of the campaign. To ensure this proper balance of effort, an analysis of the LOC system had to be made and areas had to be selected for concentrated interdiction. 10/

The 7AF prepared an analysis of the air interdiction of LOC's from North Vietnam for COMUSMACV. Under the circumstances, COMUSMACV believed that there was no choice but to use air power exclusively to block infiltration and he felt that the 7AF plan should make more effective use of air strikes in disrupting the LOC's. The best we could expect, he pointed out, was to harass and disrupt the enemy to a degree but we could never hope to block the routes for long. What he needed - and had asked for - was some type of munition that would serve to deny an area to the enemy for a period of time. He concluded that this was a difficult problem, with little prospect of appropriate munitions being developed short of a year or more. 11/ JAN 66

Defense of the "Rolling Thunder" Program

While military leaders at CINCPAC were mapping out a concept for 1966 ROLLING THUNDER operations, Defense Secretary Robert S. McNamara was defending current U.S. strategy in Vietnam before the Senate Armed Services Committee. During the January 1966 hearings, he stated that bombing operations in North Vietnam were fulfilling three primary objectives: (1) Strengthening South Vietnamese morale by showing our determination and continuing support; (2) reducing the flow of men and equipment from the North to the South and/or increasing the cost of that flow to the North Vietnamese by

bombing infiltration routes and the military sources of supply; and
(3) putting political pressure on North Vietnam to halt their subversion campaign in the South. According to the Defense Secretary, it was never intended that the bombing would break the will of the North. The primary factors affecting the will of the North would be their appraisal of the chances for success in the South. Therefore, the Defense Secretary stated, "the foundation of our strategy must be to prove to them that they could not win in the South, while accompanying that proof with bombing in the North so as to raise the political price of carrying on the campaign in the South."^{12/}

The targets influencing operations in the South, the Defense Secretary submitted, were not the power, the oil, the harbors nor the dams; rather they were the roads and the war material provided to them by other communist countries. They could literally carry the equipment and supplies on their backs and could use bicycles as the Chinese and North Koreans had in the Korea war. There was every likelihood, the Secretary said, that we could take out all of their power system, all of their oil, all of their harbors, destroy their dams, and they could still carry on the infiltration of the men and equipment necessary to support some level of operations in the South. This did not mean that they would not be hurt if we were to destroy those assets but, rather, that they were not military targets essential to the conduct of their operations in South Vietnam.^{13/ MAR '64}

Admiral U. S. G. Sharp, the U.S. Commander in the Pacific, agreed with the Defense Secretary about the possible use of human portage. In answer to the question as to whether he agreed with some Defense officials that

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the bombings in the North could be quadrupled without any decisive effect on the ground war in the South, he stated that "if we could get to the point where the Viet Cong couldn't get enough materials through then, of course, more bombings would have a decisive effect. But, as long as they find their food in South Vietnam, and their ammunitions requirements are not too high because of the character of the war they are fighting, then they would almost carry everything they need down on their backs, if they had to. That's what they did, of course, in Korea." He went on to state that the Communists got practically all of their rice in South Vietnam. "What we're trying to do now is to squeeze this down. We've captured a lot of rice. Their weapons -- most of the weapons and ammunition have to come from North Vietnam."^{14/}

On 4 January, JCS requested that CINCPAC furnish him with his assessment of the impact of the stand-down of air operations against North Vietnam. He was interested in CINCPAC's opinion of how the stand-down affected the negotiation posture of the U.S. and the GVN. He also desired evidence that would indicate any increase of Viet Cong/NVN capabilities in either South Vietnam or Laos.^{15/}

On 23 January, COMUSMACV pointed out the dangers confronting the U.S. forces as a result of the build-up by both the PAVN and Viet Cong forces during the bombing pause. CINCPAC concurred with COMUSMACV's stand and noted that the risk to the U.S. forces was particularly great in the I CTZ. CINCPAC stated there was clear evidence, as revealed by the BLUE TREE reconnaissance effort, that the enemy was moving traffic along all of the

LOC's. In addition, BLUE TREE reconnaissance had uncovered many lucrative and perishable targets. For this reason CINCPAC supported COMUSMACV's recommendation that the ROLLING THUNDER program be resumed immediately. He noted that if full resumption should be prevented because of political reasons, then he wanted, at the minimum, strikes at targets in the southern area of NVN. ^{16/}

Resumption of Bombing Operations

A new phase of the Vietnam war began with President Johnson's order to resume bombing of North Vietnam. The President justified his order to end the 27-day truce as necessary to limit the cost in lives in Vietnam. He blamed the Communists for failing to accept his offers to negotiate a peaceful settlement of the conflict, but stated that U.S. efforts in this direction would continue despite the resumption of bombing. ^{17/}

On 30 January, CINCPAC informed his subordinate commands that the ROLLING THUNDER operations would be resumed at daylight on 31 January, regardless of weather conditions. The emphasis during the first 24 hours was to be on moving targets while truck parks, transshipment areas, pontoon bridges, and dispersed storage areas would be secondary targets. Primary emphasis was to be placed on key infiltration routes into Laos and on the principal north/south rail, water, and highway LOC's. Follow-on armed reconnaissance was to be made of logistic centers, LOC hubs, and rail and highway bridges. He also authorized striking JCS targets within the armed reconnaissance area which had been previously struck. CINCPAC instructed

that the VNAF would not be utilized during the first day of operations. ^{18/}

The program was plagued by bad weather and although there were a few strikes on 31 January, they did very little damage because no surprise was achieved. COMUSMACV had previously recommended by cable that ROLLING THUNDER be allowed to start on a good-weather day so that reconnaissance planes could pick up targets of opportunity and bring in surprise attacks. COMUSMACV said, regrettably, that because of the centralized control of this program surprise was not achieved and little damage inflicted. He suspected that the decision authorities were anxious to start the campaign on a low key and the fact that the weather militated against good results was of no particular concern to them. ^{19/}

Radar Bombing Techniques

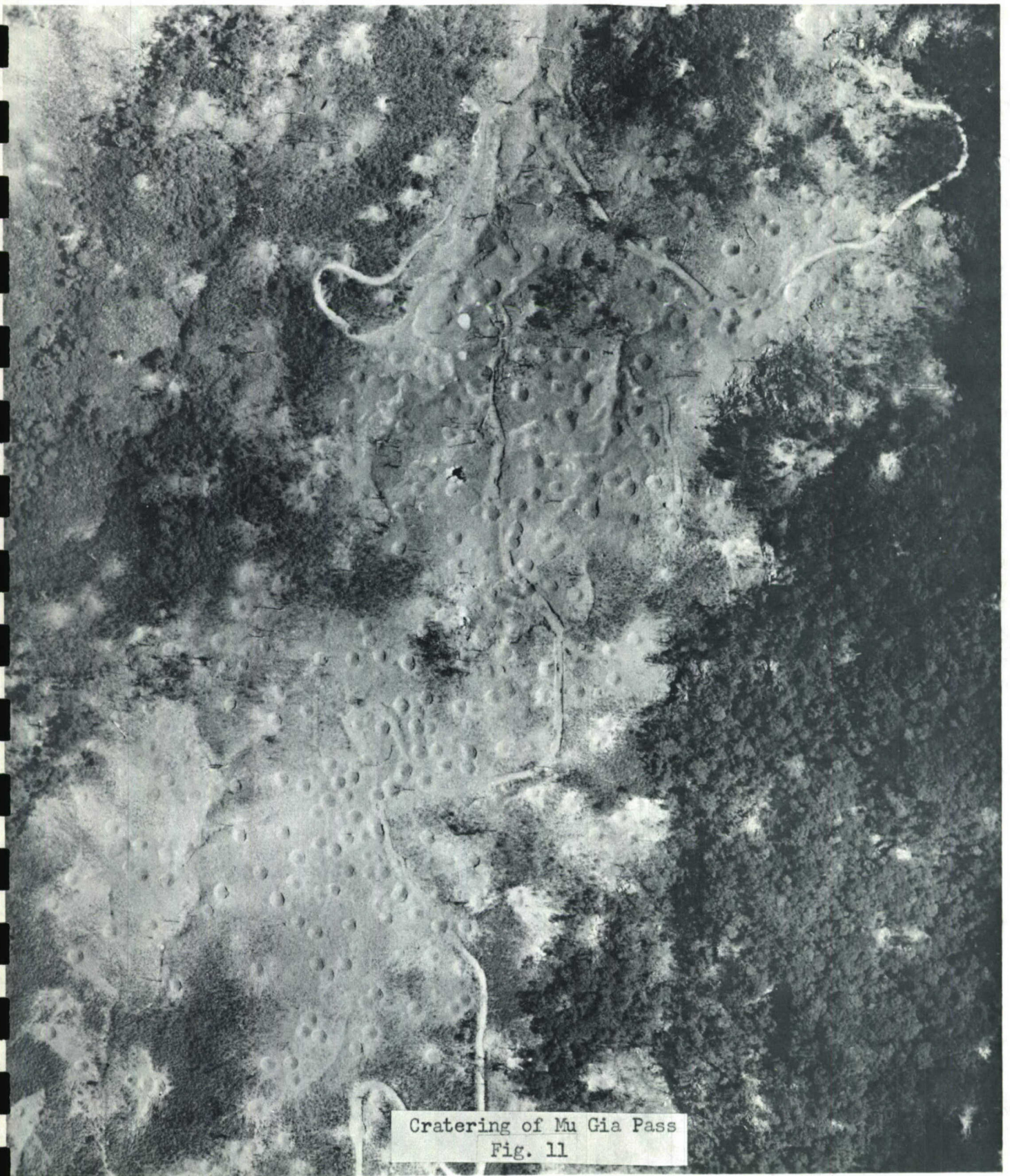
The resumption of air strikes in February saw the introduction of another method of synchronous bombing to increase all-weather capabilities. The B-66 pathfinder aircraft, using synchronous radar bombing procedures, led the fighters on their bomb runs. In areas where weather made it impossible for visual attacks, the radar pathfinder "Buddy-Bombing" technique was used. A total of 82 radar strikes were flown in February, dropping approximately 95 percent of all bombs delivered on North Vietnam by the Air Force during the month. Weather restricted photo reconnaissance of many of the targets struck but BDA photos, obtained on several of the areas, showed some heavy damage. Radar bombing was also expected to deny unrestricted movement of vehicles and equipment during bad weather periods. In addition to the bombing mission, valuable radar coverage of North Vietnam was obtained

which was forwarded to Hq USAF and Hq SAC for their radar film libraries. Since the SEA area was relatively unphotographed by radar, this coverage was of vital importance. Expected to be very important throughout North Vietnam until the heavy weather moved out, radar bombing would then be used in more isolated areas where bad weather restricted visual bombing throughout the year. 20/

On 25 February, three officers were sent for a 45-day TDY from SAC to assist 7th Air Force in developing procedures, techniques and additional radar targets. All the officers were experts in the radar bombing field and were expected to provide assistance in further refining the Radar Pathfinder - Buddy Bombing technique. 21/

This technique continued to be the mainstay of USAF efforts in North Vietnam during March. Bad weather, limiting visual strikes in many areas, placed heavy requirements on the all-weather capability of the radar pathfinder aircraft. During the month, 80 percent of all bombing operations in North Vietnam utilized this technique. Daily strikes against the mountain passes on the NVN-Laos border (Barthelmy on Route 7 and Mu Gia on Route 15) appeared to have had a restricting effect on the movement of vital supplies and ammunition. For the first time in many weeks, truck convoys were sighted during daylight hours moving slowly through Mu Gia Pass. On two consecutive days fighter aircraft were able to get below the weather and destroy or damage many of the trucks. Normally the traffic went through at night only, but the Pass had been bombed so heavily that night movement may have become less desirable due to road conditions. 22/

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Cratering of Mu Gia Pass
Fig. 11

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In addition to leading fighters to their primary targets and giving them the signal to release, pathfinder aircraft provided an all-weather alternate delivery capability for sorties unable to strike visual targets. 23/

With the addition of the B-57 to the bomb delivery role, as a pathfinder aircraft, air operations became more versatile. A variety of ordnance was added and the role of the pathfinder was expanded to strike all types of targets. Heavier seeding of the passes and lines of communications with 2,500 time-delay bombs was being accomplished with more effective time spreads between detonations. Pathfinder-led strikes continued to improve in accuracy and bombing reliability. An excellent target study facility was added at Takhli. The B-66E radar navigators from the 41st TRS now studied radar photography of their target prior to the flight. New bomb run procedures, radar tuning techniques and overall crew experience 24/ contributed greatly to the increased/overall accuracy of radar bombing.

An interdiction program for the main routes above 17 degrees north was developed during the January bombing stand-down and implemented during February. The purpose of this program was to deny the enemy forces access into South Vietnam. The targets selected included Primary and Selected Interdiction Points (PIP's and SIP's) on the major lines of communications and selected Dispersed and Isolated Targets (DIT's) to include POL, storage, barracks, and other fixed and lucrative targets. 25/

The Dien Bien Phu Airfield was one of the lucrative targets struck during February. Acting on a recommendation from the American Embassy, Vientiane, for an early strike against the airfield, the JCS on 3 February

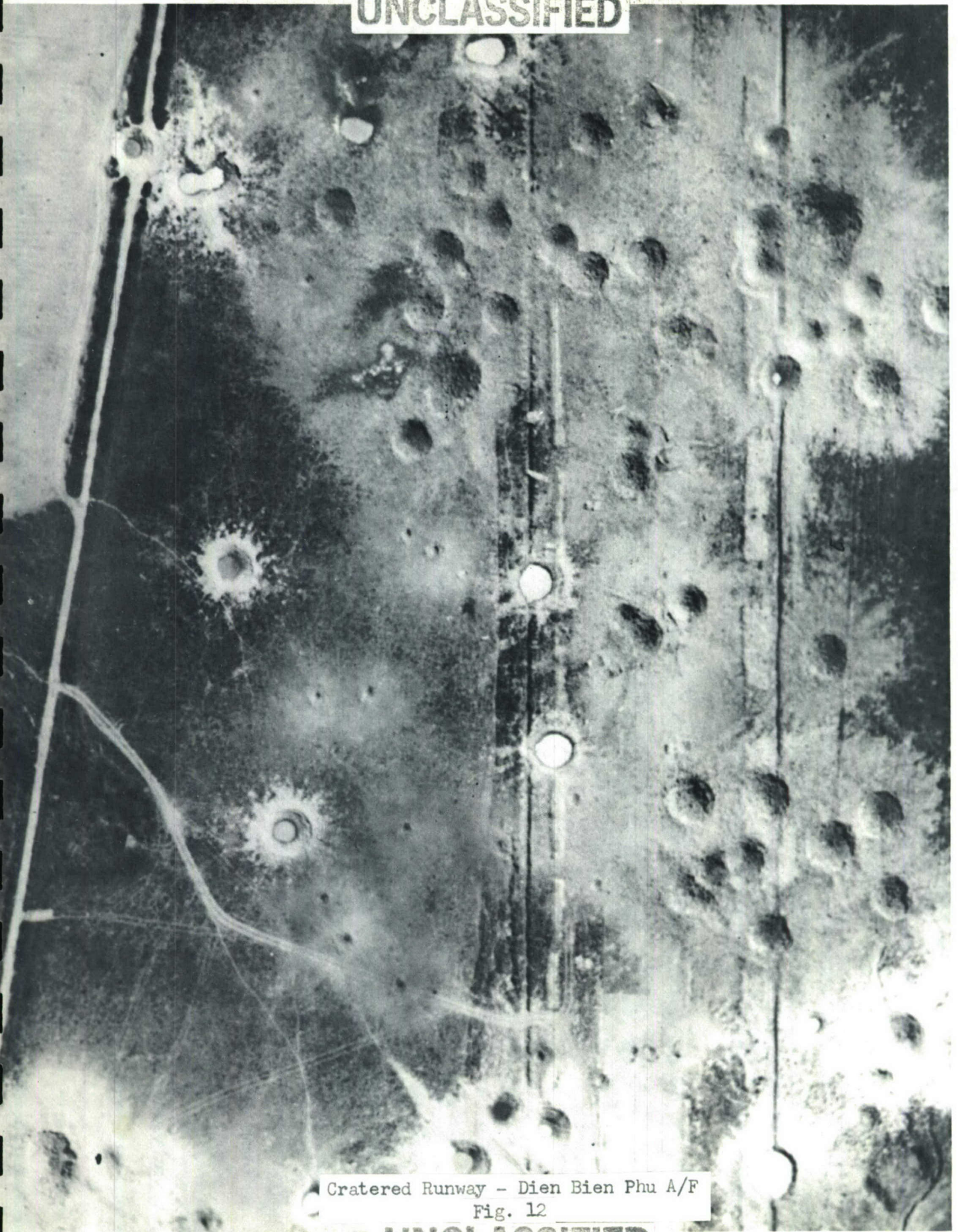
authorized a strike as soon as the weather permitted. The JCS said that the weight of the effort should be of a magnitude sufficient to neutralize military activity. The strike was successfully conducted on 6 February by 31 aircraft. The aircraft runway was severely cratered and rendered unserviceable. Twenty buildings were destroyed and eight damaged. Some 60 percent of the entire complex was reported destroyed or damaged. Subsequent re-strikes during the month resulted in additional damage. ^{26/}

In addition to the physical damage inflicted on this target, the strike had important psychological overtones. Dien Bien Phu had become a symbol of the collapse of French power in 1954 and was held in high esteem by North Vietnam. The February attacks showed its vulnerability to U.S. air-power and may well have served as a reminder to Hanoi that they were facing a different and formidable opponent. ^{27/}

Rules of Engagement

Certain restrictions were imposed on ROLLING THUNDER 49 air strikes which began on 1 March. Locks and dams and that portion of JCS Target 52 which had been formerly designated JCS Target 38, were excluded as authorized targets. Coastal armed reconnaissance south of 20° 31'N was authorized to destroy recognized NVN naval craft and craft which fired upon U.S. aircraft along the North Vietnam coast, in the vicinity of coastal islands, in mooring areas and in estuaries. Such armed reconnaissance was also authorized north of latitude 20° 31'N, along the NVN coast and the off-shore islands within 3nm of NVN territory. These attacks, however,

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Cratered Runway - Dien Bien Phu A/F
Fig. 12

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could not be made closer than 25nm from the Chicom border. In addition, they were to avoid a 10nm circle from the center of Haiphong. They were not authorized to attack naval craft, unless first fired upon, north of 20° 31'N and outside of the 3nm limit of the NVN coast and the off-shore islands. Armed reconnaissance could be conducted in NVN, south and west of the line running due west from the coast at latitude 20° 31'N to longitude 105° 20'E, then due north to a point 30nm from the Communist Chinese border, then southwesterly to the Laos Border. Craft would remain 30nm from the Communist China border. Coastal armed reconnaissance was authorized in the area 20° 31'N to a point not closer than 25nm from the Chicom border. 28/

JCS authorized 8,100 attack sorties per calendar month; approximately 3,000 attack sorties were to be executed in Laos and 5,100 in NVN. Daily allocations were permitted to be varied between the two countries depending on operational factors and weather conditions. The JCS did not impose restrictions on the maximum number of sorties that could be flown on any one day. However, if the sortie rate during any month was lower than the 8,100 sorties authorized, no carry-over into the next calendar month would be permitted. 29/

Destruction of units or craft which fired upon U.S. aircraft en route to or from missions was authorized. Unexpended ordnance could be utilized on authorized ROLLING THUNDER objectives by these aircraft, including STEEL TIGER and BARREL ROLL aircraft. Moreover, RLAF targeted road segments in Laos were authorized attack by returning aircraft. 30/

Reconnaissance was authorized prior, during, and after strikes. Populated areas were to be avoided. As required to protect the strike forces, MIGCAP, screen aircraft and other appropriate force elements could be used in combat. Attacks on NVN air bases from which attacking aircraft might be operating were not authorized. During this mission, IRON HAND operation would be limited to the armed reconnaissance area authorized for RT-49C. Assignment of BARREL ROLL and STEEL TIGER missions was authorized in the ROLLING THUNDER area, as appropriate. 31/

The JCS had told CINCPAC and COMUSMACV in February that RT-49 was considered to be a step in the right direction toward mounting an effective and flexible air campaign against North Vietnam and the infiltration corridors through Laos. However, defects were noted - such as the withholding of authority to execute IRON HAND in the northeast quadrant and in maintaining this quadrant as a sanctuary. The JCS stated the intent to push ahead in these areas and had asked CINCPAC and COMUSMACV to submit their comments by mid-March. At that time, the 7AF recommended that the NE Quadrant (Route Package VI) be opened to armed reconnaissance. This would permit constant interdiction of the vital NE rail line between Hanoi and Lang Son, and the rail line between Hanoi and Haiphong. The Commander, 7AF, wanted the same rules of engagement to be used that were in effect for RP I through V. He supported his recommendation by noting that the armed reconnaissance strikes against RP V interdicted the LOC of the NW rail line (Hanoi/Lao Kay) through the photo-confirmed destruction of two bridges and numerous rail cuts. The NE quadrant was subsequently reopened to strike operations on 20 March and

CINCPAC notified COMUSMACV accordingly. ^{32/}

The 7AF Commander also recommended that B-52 aircraft be assigned to the job of interdicting targets in the Mu Gia, Nape and Barthelemy Passes on a continuous basis. He felt that this would free the tactical aircraft so they could carry out armed reconnaissance against other targets. All POL storage facilities as well as selected power plants in NVN also should be considered as prime continuing targets for the armed reconnaissance program. Further, the Commander, 7AF felt that it was necessary to remove the restrictions which applied to dams and LOC's in order to permit interdiction of waterway LOC's by lowering the navigable water levels. Such interdiction would also negate trafficability of portions of the inland waterways. ^{33/}

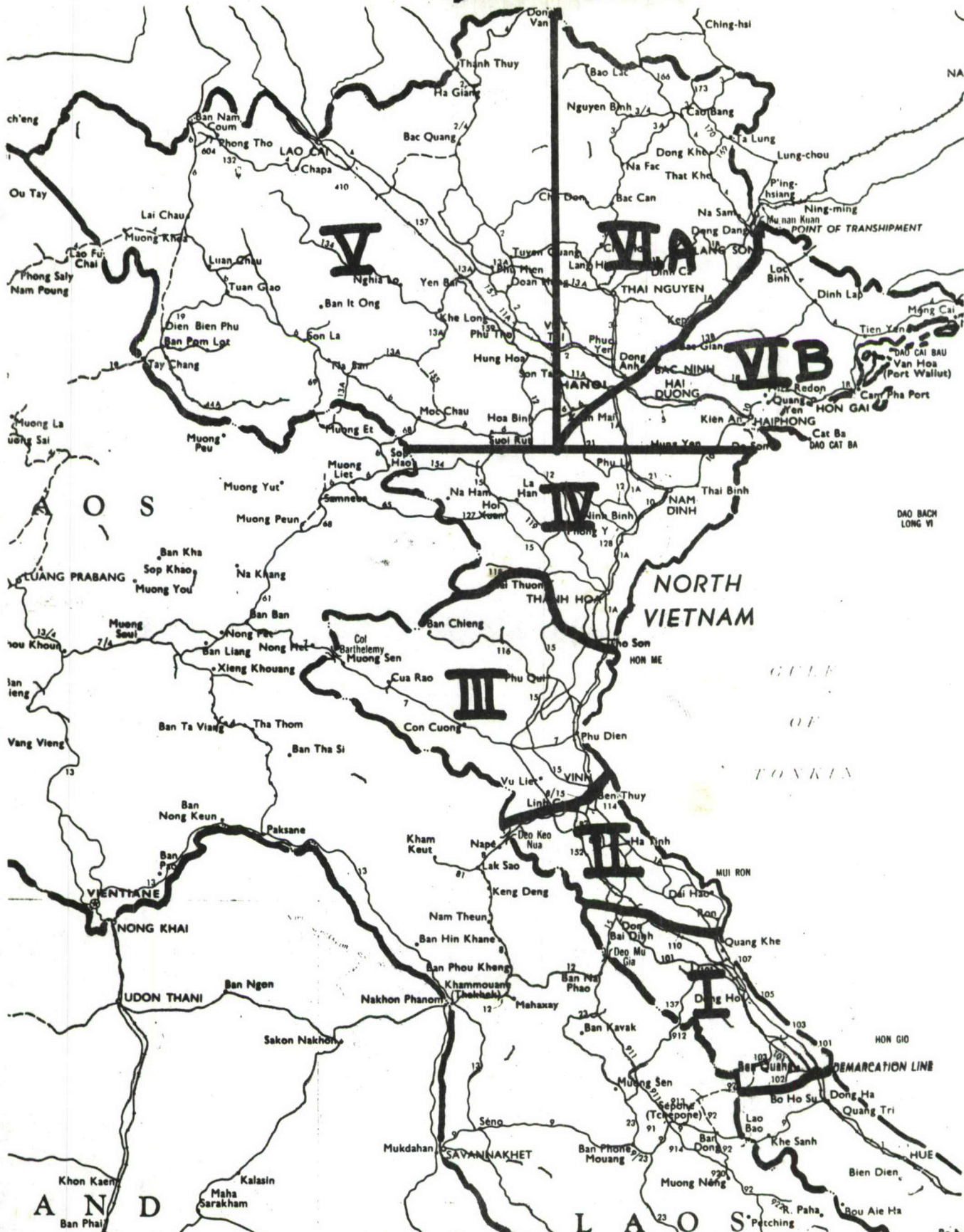
Coordinating Air Operations

On 22 March, COMUSMACV presented CINCPAC with a proposed plan, patterned after TIGER HOUND, for the conduct of air operations in RP I and II. RP I would be assigned to 7AF and RP II to CTF 77; existing control procedures would be employed. Air operations in these packages would be augmented from in-country assets at Da Nang, Cam Ranh Bay, and Phan Rang as required. Part of TIGER HOUND would be shifted to Packages I and II, as the weather in Southern Laos deteriorated. In this connection, airborne FAC's in A-1E's would be used at Hue/Phu Bai to provide continuous visual reconnaissance and forward air control. Flak suppression measures would be taken. ABCCC aircraft would permit communication with aircraft over RP's I and II and Southern Laos and divert strikes to lucrative targets. COMUSMACV said he

believed that success comparable to TIGER HOUND could be achieved. Tactical intelligence would be exploited on an immediate basis, using the same intelligence assets as used in TIGER HOUND. In addition, the 7AF/TF77 Joint Armed Reconnaissance Coordinating Committee would continue to agree on levels of effort, exchange of intelligence and BDA. ^{34/}

COMUSMACV noted that he would have mission responsibility and full control of these operations, but would delegate operations to the Air Force Component Commander (AFCC). However, he would review the progress and would give guidance on a day-to-day basis in accordance with good management procedures. All resources appropriate and available would be focused on this mission in accordance with COMUSMACV's tactical judgment. He said that the 7AF commander concurred. He, therefore, requested authority to implement this proposal as a matter of operational urgency. This would give him the authority to bring military power to bear most effectively on enemy approaches to the battlefield for which COMUSMACV was responsible. He visualized that current arrangements for other route packages in NVN would continue. ^{35/}

On 31 March, the 7AF briefed COMUSMACV on the subject of new designations of areas and programs for the air war. As a result of this conference, COMUSMACV made the decision to redesignate the areas for planning teams Alpha, Bravo, Charlie, and Delta to correspond with the 7AF planning teams which were in existence as of that date. Bravo area covered RP I and STEEL TIGER area (as redefined). Charlie area covered South Vietnam, and Delta covered the TIGER HOUND area (expanded). (This was to be effective, as of



ROUTE PACKAGE AREAS

Fig. 13

that time, "in house"; however, implementation external to MACV had to await approval of higher headquarters.) The requirement existed to set up a system of continued monitorship and analysis of the routes and choke points in the delineated areas of the air war. It was felt this requirement should be the subject of daily briefings for which 7AF would assume responsibility. ^{36/}

On 1 April, CINCPAC issued the basic operations order covering ROLLING THUNDER and related support programs. PACOM and VNAF forces were given the mission of conducting coordinated air strikes, as well as photo reconnaissance and armed reconnaissance against selected targets and LOC's in North Vietnam. To preclude any mutual interference of forces during the air operations, CINCPACAF was given the responsibility as the coordinating authority for ROLLING THUNDER, IRON HAND, and BLUE TREE operations. COMUSMACV was authorized to utilize VNAF forces in Route Package I. ^{37/}

Areas of primary responsibility were assigned for intelligence analysis, photo reconnaissance and armed reconnaissance as follows:

COMUSMACV: Route Package I. The package included the area north of the DMZ and south of a line starting on the coast at 17-52N, 106-27E, along and including Route 108 to its junction with Route 109, direct to the junction of Routes 195 and 15, due west to the NVN/Laos border. Primary responsibility for Nape Pass along Route 8 to the junction of Route 81 in NVN, and Barthelemy Pass along Route 7 to the junction of Route 75 in SVN.

CINCPACFLT: Area included Route Packages II, III, IV and VIB. The area was given as south and east of a line starting on the NVN/Laos border at 20-31N, east to 20-31N, 105-20E, northeast parallel to but not including the NE rail line and Route 1A to the CHICOM border, and north of the line defined for Route Package I.

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CINCPACAF: Area included Route Packages V and VIA. The area was north and west of the line defined for CINCPACFLT, including the NE rail line and Route 1A northeast of Hanoi.

COMUSMACV was authorized to adjust his weight of effort between the STEEL TIGER and BARREL ROLL areas and the Route Package I area.

When dictated by weather conditions, or when both commanders deemed it operationally advisable, both CINCPACAF and CINCPACFLT would direct sorties into each other's primary area of responsibility. Responsibility for Route 1A northeast of Hanoi and the rail line paralleling Route 1A was assigned to both CINCPACAF and CINCPACFLT. This responsibility included the coordination of effort and status analysis. The responsibility for intelligence analysis and status of targets in Route Package I was assigned to both ^{38/} COMUSMACV and CINCPACAF.

CINCPAC stated that Alpha targets would be assigned by CINCPAC execute messages. These targets would not necessarily be by assigned areas. He stated that the areas given by him above excluded the restricted areas such as the Haiphong and Hanoi circles and the Chicom buffer zone. ^{39/}

Air Force aircraft in SEA and USN carrier-based forces in the South China Sea were authorized for ROLLING THUNDER, IRON HAND, and BLUE TREE operations. VNAF forces were authorized for ROLLING THUNDER operations only. Use of Thai-based aircraft required the coordination with the American Ambassador, Bangkok. ^{40/}

As required, all missions were authorized the following: CAP, SAR, FAC, weather reconnaissance, flak and SAM suppression, flare support, ECM/ELINT

support, and prestrike, concurrent and post-strike reconnaissance. To reduce the risk to forces involved, photo reconnaissance missions for BDA would be scheduled on a random basis after strike against sensitive targets. Surface picket stations and airborne early warning capability would be utilized to maximum extent feasible. Also, as required to protect allied forces, RESCAP, MIGCAP, BARCAP, and other appropriate elements would engage in combat, including SAM suppression. Except for Thai-based aircraft, missions could be diverted to SVN from NVN. When missions were diverted, however, they would comply with the rules of engagements applicable to the area to which diverted. The OPREP-1, when feasible, would include alternate weather targets. In order to avoid mutual interference, coordination would be accomplished. ^{41/}

The following instructions applied for ROLLING THUNDER operations: ^{42/}

1. Optimum unclassified conventional ordnance for target to be attacked would be carried by the aircraft.
2. Safety of forces and the reduction of risk factors in attacking targets in heavily defended areas required special considerations. Unless otherwise directed, these attacks could be executed with relatively small elements in a series of attacks spread over the specified strike days. This would permit ultimate achievement of desired damage level. Heavy strikes could be launched in such areas when tactical considerations warranted such attacks.
3. Maximum feasible damage: This was defined, for specific targets, as that amount of damage which neutralized or rendered a target ineffective and/or unable to perform its basic function. The best available intelligence would have to be used in this assessment, as this was a judgement factor which was necessary to permit the commander to weigh the risks against the gains that were involved in committing additional forces.
4. Destruction was authorized for recognized military targets of opportunity in the immediate vicinity of the target areas and along the armed reconnaissance routes and craft or units which fire upon friendly aircraft,

en route to or from missions.

5. JCS numbered targets which were previously struck were authorized for attack by aircraft returning from strike and armed reconnaissance missions, provided that they were in the authorized armed reconnaissance area. The objective was to maintain these targets non-operational.

6. Within the approved BARREL ROLL/STEEL TIGER armed reconnaissance area, aircraft normally overflying Laos in returning to Thai bases were authorized to attack LOC's in Laos under visual conditions. Such attacks, however, could not be carried out in inhabited areas.

7. Coastal armed reconnaissance would include coastal inland, estuaries and NVN naval craft mooring areas. The area in which U.S. armed reconnaissance could be conducted was from the DMZ north to the limits designated above. Objectives, in order of priority, for these armed reconnaissance flights included:

Resources in NVN that contributed to the support of aggression would be destroyed. POL facilities were accorded the highest priority in the targeting consideration.

Military support facilities and military forces would be destroyed. Emphasis for destruction would be against activities and facilities contributing directly to the movement of men and material into SVN and Laos. This destruction would include logistic hubs, military support facilities, targets within logistic centers, and targets along segment objectives.

Armed reconnaissance would destroy vehicles, rolling stock as well as watercraft and LOC support facilities. Such support facilities would include parks, rest and refuel points, transshipment areas, and maintenance and repair facilities.

Interdiction of movement on selected LOC's by a concentration of armed reconnaissance on a night and day basis against designated logistic centers, LOC hubs, and segment objectives.

Movement along certain LOC's would be harassed, disrupted and hindered by striking carefully selected interdiction points, (SIP's). Selected interdiction points could include the destruction of a crossing area or a key bridge where it would be extremely difficult to bypass. It could block a vulnerable highway segment. Road cratering, however, would be held to the minimum and would only be conducted in those areas where the terrain features would make bypass difficult.

The following instructions applied for IRON HAND: ^{43/}

1. The specific objective of IRON HAND flights was to locate and destroy occupied SAM sites or SAM support facilities.
2. The instructions given above for ROLLING THUNDER also applied to IRON HAND.
3. IRON HAND missions could be flown in conjunction with ROLLING THUNDER armed reconnaissance. During such a time IRON HAND could use ROLLING THUNDER targets as alternates.

BLUE TREE had as its specific objective the acquirement of intelligence to support the ROLLING THUNDER and other SEA objectives. The following instructions applied: ^{44/}

1. Control of BLUE TREE photo reconnaissance would be by CINCPAC who would establish objectives, maintain and update requirements program for the collection of maximum intelligence.
2. BLUE TREE area of operations would include all of NVN with the exception of restricted areas.
3. Whenever there were unforeseen or urgent requirements of a critical nature, these could be included as modifications to approve missions. This would be done by including these requirements in the daily intent reports. Such action would constitute approval unless CINCPAC directed otherwise.
4. When feasible, IRON HAND and BLUE TREE photo mission would be combined.

The following restrictions were applicable to BLUE TREE, IRON HAND and ROLLING THUNDER: ^{45/}

1. Attacks would avoid populated areas. Utmost caution would be exercised in the attacks to keep collateral damage to the minimum consistent with the desired objective.
2. Certain types of targets would not be attacked. These included hydro-power plants, locks and dams, fishing boats, sampans or

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houseboats in populated areas which appear to be water homes; Yen Phu Army Barracks, and the Vinh Army Barracks Central NE. Attacks could be made on these targets only when specifically designated by CINCPAC directive.

3. Certain areas were designated as restricted areas. No attacks of any type were authorized in those areas, except as approved. Approval would be on a case-by-case basis or specifically authorized in the execution message. Specific CINCPAC direction would be required for entry of BLUE TREE resources into these restricted areas. The restricted areas included:

No closer than 30nm from the center of Hanoi.

No closer than 10nm from the center of Haiphong.

A zone along the Chicom border 30nm wide from the Laotian border east to 106 degrees and 25nm wide from there to the Gulf of Tonkin.

4. The Chinese border would be avoided. Flight paths to and from target areas had to be planned so that they would not come any closer than 20nm to the Chicom border. For armed reconnaissance attacks, such attacks had to be within the approved armed reconnaissance area.

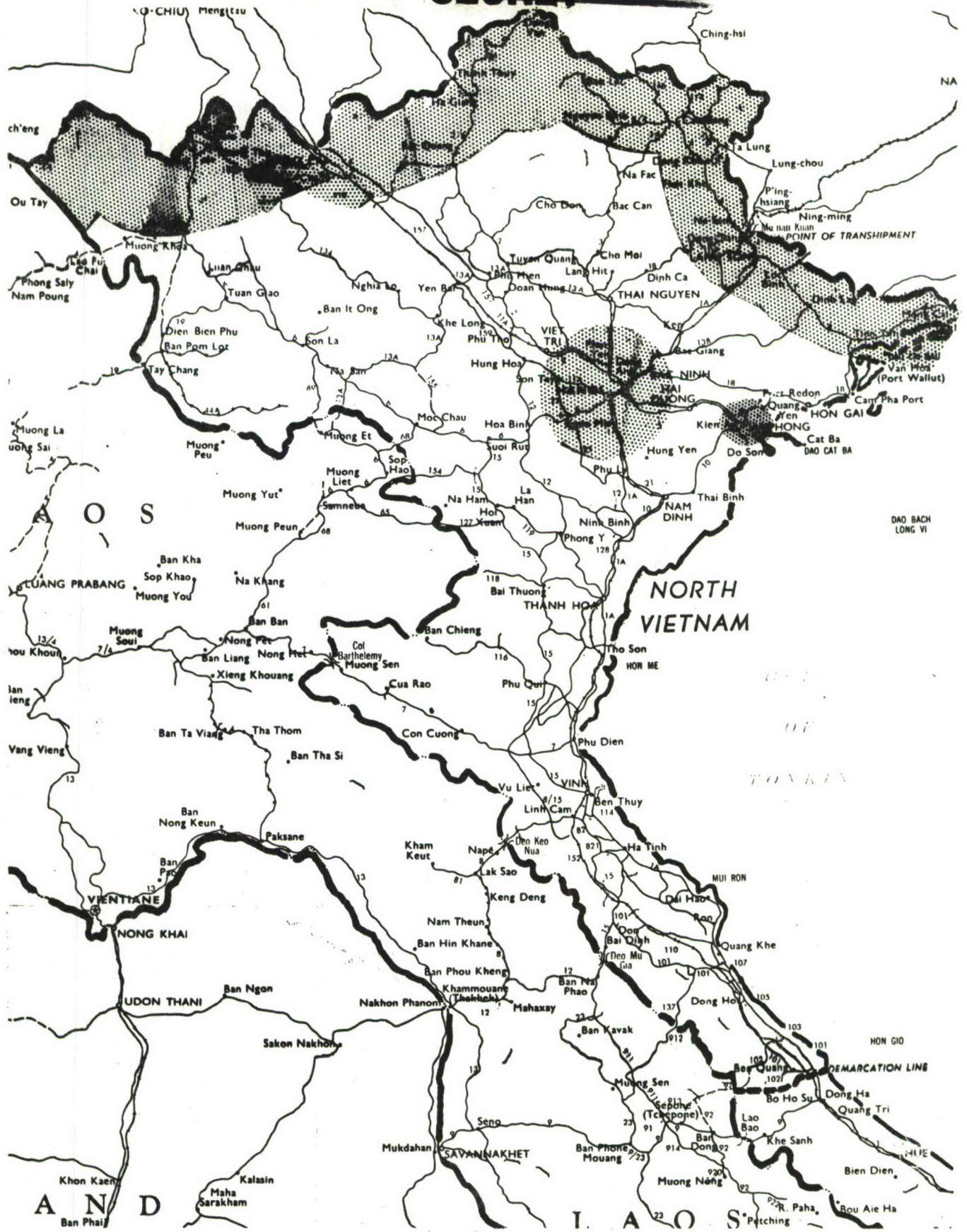
5. IRON HAND operations were restricted to the authorized ROLLING THUNDER armed reconnaissance. This restriction remained unless CINCPAC directed otherwise.

6. Aircraft could enter into the restricted areas when engaged in immediate pursuit. However, even during such pursuit, these aircraft were prohibited from getting any closer to the Chicom border than 12nm. While in pursuit these aircraft could not attack SAM sites which were located within 30nm of Hanoi. Moreover, they could not strike the NVN bases from which the attacking aircraft were operating.

7. Care would be taken in the employment of ECM. Employment on a carefully planned basis was considered essential in order to minimize degradation of U.S. capability by overexposure. It was felt that the enemy forces could be provided major benefits through the indiscriminate use of ECM. Indiscriminate use could degrade SIOP capability.

8. Caution would be used at all times to avoid any inadvertent release of weapons in the DMZ. When flying during the night or when

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THE RESTRICTED ZONES

Fig. 14

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under conditions of limited visibility, any strike within 20nm of the DMZ would be conducted only with FAC confirmation of position or radar confirmation of position. Command signals would be dual flagged as appropriate, i.e., UE/IH. This could be done since the ROLLING THUNDER, BLUE TREE and IRON HAND programs were closely related and since they mutually supported each other.

Counteractions to Enemy Buildup

On 4 April, the JCS summarized the status of action taken to intensify air operations to counter the accelerated enemy build-up. They concurred with the objective of COMUSMACV to attain, during the remainder of the good weather period, the maximum damage and disruption of the lines of communication in North Vietnam and Laos supporting the communist forces in South Vietnam. This was being supported by assignment of considerable weight of effort in the STEEL TIGER and the ROLLING THUNDER program directed toward interdicting these LOC's. ^{46/}

The JCS had a study group review the ROLLING THUNDER effort and USIB analysis on infiltration. Intensive studies were also being conducted in Honolulu on the vulnerability of the enemy's LOC's and transportation systems. The JCS noted the desirability of having intelligence agencies at national level concentrate on the study of this specific vulnerability. ^{47/}

The area north of Vinh was considered the "strategic rear"; the desired accent in this area was on the war-supporting activities and fixed targets. Armed reconnaissance was also considered important. The weight of effort required for this area was authorized with interdiction to be applied through the maximum depth. In the area south of Vinh, the emphasis on air

efforts would be placed on armed reconnaissance. As was recommended, sufficient weight of delivery was authorized to meet the requirements for the ROLLING THUNDER/STEEL TIGER armed reconnaissance effort in Laos and NVN south of Vinh. Responsibility for armed reconnaissance in the southern-^{48/}most areas of NVN had been assigned to MACV.

COMUSMACV had recommended striking POL and other facilities. These included selected power plants, dams and locks affecting inland waterway traffic, jet airfields, the Kep EW/GCI complex, selected ports (including Haiphong), and key rail, inland waterway and road chokepoints. The JCS said there was general concurrence with this concept, however, there were certain shifts in priority. They noted that ROLLING THUNDER 50 extended attacks to certain of these targets. It also provided that plans would be made for strikes on POL, a thermal power plant and a cement plant. Execution of the plan would not be made until directed. It was also noted that certain tactical restrictions, which established time limits and required single strikes,^{49/} had been removed.

On 4 April, CINCPAC stated that there was considerable coastal traffic along the northeast coast and that it was particularly heavy in the vicinity of the islands off the Red River estuaries. Third-country ships were being off-loaded by lighters a considerable distance away from Haiphong. CINCPAC felt that attacks against these lighters, when they were well away from the third-country ships, would be very effective in causing the shipping interests to cease their visits to the Haiphong area. Water traffic from Haiphong and in the areas adjacent to the south of Haiphong was becoming

increasingly important. CINCPAC pointed out that it would be more effective to strike this traffic in the concentrated areas around Haiphong rather than trying to seek out such traffic after it had been dispersed along the coast. ^{50/}

He backed up his recommendation by pointing out that strikes in the vicinity of Cam Pha had had a most salutary effect. This was a case where some third-country shipping had been diverted without actual strikes on the port facilities. He considered that selective strikes against fringe areas of Haiphong, therefore, would cause a similar or greater reaction. CINCPAC also believed that authority for increased coastal reconnaissance could result in the withdrawal of third-country shipping. ^{51/}

The value of an intensive 24-hour strike/recce effort around a choke point on a heavily-travelled LOC was dramatically illustrated on 25-26 April. ^{bb} During that period 7AF forces destroyed or damaged 28 heavily camouflaged trucks north of the Ron Ferry on Route 1A. A high level of night truck traffic along the route had been suspected for some time and periodically confirmed by photo reconnaissance. During the day it was difficult to find the trucks in their heavily camouflaged, pre-planned parks and it was equally difficult at night as they quickly dispersed when flares were dropped. Increasing enemy defenses below 18 degrees indicated a need to destroy the trucks before they reached the protection of their parks. To insure a minimum time lapse between photo readout and strike launch, both strike and recce forces were concentrated in the area to insure 24-hour coverage. ^{52/}

The Ron Ferry and the nearby Quang Khe Ferry were struck on the morning

of the 25th; their approaches and bypasses were interdicted and extensively seeded with time-delay fused bombs. One ferry, caught in the open at Quang Khe, was also sunk. Recce flights early in the evening of the 25th disclosed 35 trucks backed up on both sides of the Ron Ferry awaiting to cross. Ferry boat activity at both locations was in full swing in spite of the VTD bombs. Four F4C's from the 8th TFW dropped flares and found two groups of trucks; they reported at least two trucks destroyed with others damaged. Additional strikes were carried out until 18 trucks had been destroyed and ten damaged. There were no U.S. losses although the area was defended by 57mm radar-controlled AAA. In view of the success at the Ron Ferry, future "full court press" tactics would be employed at selected choke points to back up large numbers of vehicles and destroy them before the enemy could disperse. 53/

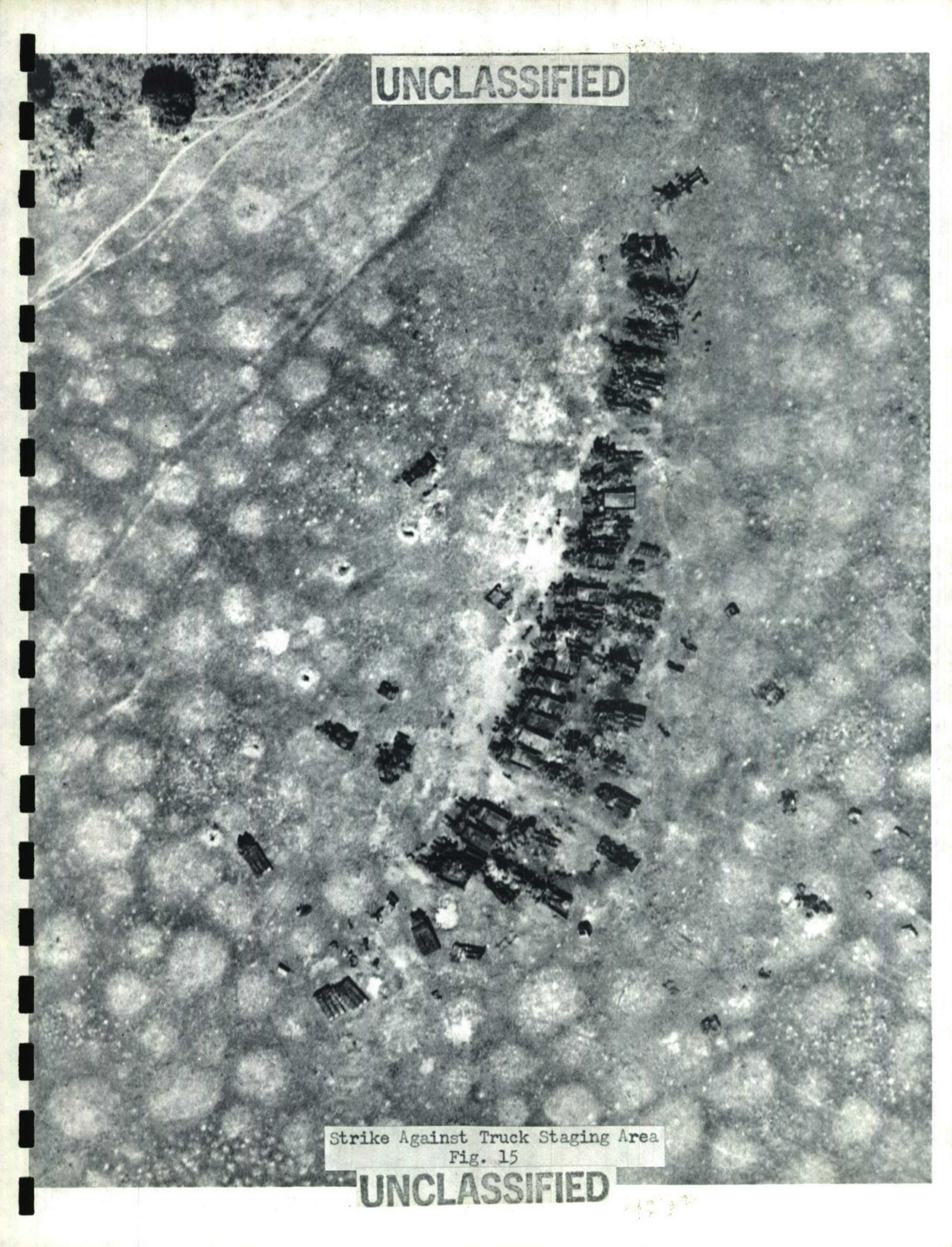
✓ Initiation of B-52 Attacks

In accordance with the 7AF recommendation, made in March, the first use of B-52's in North Vietnam took place on 11 April against the Mu Gia Pass. Thirty Guam-based B-52's dropped 695/750 lb. and 694/1,000 lb. bombs on a road segment of Mu Gia Pass, from an altitude above 30,000 feet. Photography revealed that 26½ hours after the strike, all craters were filled in and there were tracks across them. The speed with which the road was made serviceable is an indication of the strategic value of this pass to the enemy. 54/

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Strike Against Truck Staging Area
Fig. 15

UNCLASSIFIED



"Gate Guard"

A concept had been developed in late April which addressed itself to the problem of impeding the flow of supplies into Laos and South Vietnam by concentrating greater effort within RP I. A group of interdiction points located on the major LOC's was selected for concentrated daylight strike. These targets formed a series of systems, or belts, oriented east-west across Route Package I. A total of three systems were developed. Due to the limited number of available sorties, only one system was initially attacked. The objective was to interdict the routes by day and then apply night armed reconnaissance to destroy fleeting targets trapped north of the interdiction points. The program was designated operation GATE GUARD and initial strikes under the concept were begun on 10 May 1966. Poor weather during most of May prevented full application of the concept. However, during June, improved weather and the use of newly-installed radar bombing sites (MSQ-77) permitted full implementation.

Operation GATE GUARD continued through July, forcing the enemy to exert considerable effort to keep his supply lines open through this vital area. Photography and visual sightings indicated an increased use of watercraft to move supplies. The MACV "Order of Battle Summaries" noted that enemy infiltration reported for June and July was reduced to almost half of that for the months of January through May. (Interdiction of LOC's in RP I was a rotating AF and Navy operation until the rotation system was dropped in April and RP I became a full-time AF responsibility.) ^{55/}

Deterrent and Retaliatory Strikes

On 9 May 1966, COMUSMACV recommended to CINCPAC that the Thai Nguyen Iron and Steel Complex be struck by air. He believed that striking the steel plant would serve as a deterrent to further attacks on South Vietnamese industries by the Viet Cong. On 23 April, a cement roofing plant had been attacked by the Viet Cong resulting in six South Vietnamese killed and six wounded. An estimated force of three Viet Cong platoons attacked three textile factories on 24 April. These textile factories, which produced nets, mosquito netting, and bulk cloth, received extensive damage and production had ceased. COMUSMACV noted that these incidents represented the first reported attacks against privately owned industrial property within the Capital Military Region. They were proof of the Viet Cong determination to disrupt the local economy and to hamper industrial development. ^{56/}

COMUSMACV believed it should be made clear to the Viet Cong that attacks of this nature would be prohibitively costly to the NVN. In his opinion, it would not be profitable to destroy a portion of NVN's textile capacity as a deterrent to further Viet Cong attacks on SVN industries. He believed it would be more appropriate to attack an industrial target which had considerable military significance, such as the Thai Nguyen Iron and Steel Plant (JCS Target 76). This target was considered to be an economic asset of appropriate importance to North Vietnam. He pointed out that this was the first large steel plant to be built in NVN. It had a designed capacity of 300,000 metric tons of pig iron and 200,000 tons of crude steel yearly. According to Hanoi, this plant was capable of providing 20 percent

of NVN's domestic iron and steel requirements when at full production. COMUSMACV, therefore, asked that this steel plant be struck as a deterrent to further destruction of SVN industry by the Viet Cong. ^{57/}

In response to COMUSMACV's recommendation, CINCPAC told JCS he concurred with COMUSMACV's basic intent but that he did not concur with the idea of striking the Nguyen Iron and Steel Complex. In his opinion, the Viet Cong attacks on the four South Vietnamese factories constituted further justification to strike the POL industry. He believed that destruction of the POL system would be more meaningful and would further deny NVN essential war-making resources. CINCPAC, therefore, recommended to the JCS that approval be given for the destruction of NVN POL system, beginning with the Haiphong POL. ^{58/}

In response to COMUSMACV's "suggested targets for retaliatory air strikes in the event like targets were attacked in SVN," CINCPAC responded on 25 May that he believed the criterion for a retaliatory strike should be to provide the maximum military return for the strike effort. For this reason, CINCPAC could not concur in the concept that retaliation should necessarily be against targets of like category. Furthermore, if the enemy anticipated retaliation in kind, he would be alerted for our counter attack. ^{59/}

CINCPAC stated that CINCPACFLT, CINCPACAF, and CINCSAC had effective plans ready for implementation for nine JCS targets for reprisal attack should like targets be attacked in SVN. These were: Hanoi POL, Kep Airfield, Haiphong POL, Phu Yen Airfield, Hanoi Defense Ministry, Thai Nguyen Thermal Power Plant, Uong Bi Thermal Power Plant, and the Thai Nguyen Steel

Plant. Furthermore, plans existed for attack against all airfields in the Hanoi/Haiphong complex should JCS so direct. ^{60/}

On 24 May, the JCS stated they were loath to place targets in a reserve category for retaliatory purposes and CINCPAC concurred with this thinking. In a message to the JCS on 27 May, CINCPAC noted, with regard to POL targets, he saw more and more evidence of dispersal into continually smaller increments, much of it underground. It would become increasingly difficult to locate and strike POL targets and thus returns for the effort expended would be limited. ^{61/}

CINCPAC said that his recommendations, by priority, for a revision of the ROLLING THUNDER ground rules, starting 1 June, were as follows: ^{62/}

1. The ten targets, particularly the seven POL targets listed in the 1 April ROLLING THUNDER execute order. Authorization to strike POL targets anywhere in Route Packages 6A and 6B. He noted that as of that time he was pretty much restricted to particular LOC's.
2. Authorization to strike selected targets in the Hon Gay and Cam Pha complexes. Hon Gay areas B and C contain general cargo storage buildings and RR shops which could be struck with little danger of damage to the piers or any foreign ship present. Such a strike would be most effective in deterring future visits by foreign ships.
3. Relaxation of the rules for coastal armed reconnaissance north of 20-32 N including the authority to strike any clearly identified NVN cargo type vessel.
4. Reduction in the size of the Hanoi-Haiphong restricted area, or authorized targets within the areas on a case by case basis. He noted that the ten targets listed in the 1 April execute order were an example, as eight of these targets were located in the circles for specific type targets only, such as POL.
5. Relaxation of the armed reconnaissance coverage to allow strikes against other known lucrative targets in the NE quadrant,

even though not in the immediate vicinity of assigned LOC's.

With respect to JCS target planning, the Deputy Commander, 7AF/13AF Udorn expressed concern over the stereotyped tactics employed in our attacks against North Vietnamese targets. Pilots involved in these strikes were unanimous in their views concerning the loss of tactical surprise as a consequence of our repetitious and uniform procedures day after day against these targets.

The Deputy Commander said that his visits to Takhli, Korat and Ubon had heightened this concern. During these visits, he had personally briefed pilots, at length, on the problems which plagued 7AF in carrying out such complex missions. However, the pilots had, in turn, convinced him that there must be ways and means not yet exploited to provide more flexible but less vulnerable tactics. Based on recent and extensive discussion, he outlined a proposed procedure which he recommended be pursued with higher headquarters. His proposal assumed that those headquarters would agree to designate JCS targets for the next cycle well in advance - several days or even a week. The information would then be immediately passed on to the tactical fighter wings specifically involved. These fighter wings would then recommend for 7AF consideration their entire attack plan, including tactics, routing, timing, ordnance loads, etc. The Deputy Commander believed that, if 7AF were successful in obtaining such pre-notification from higher headquarters, many original and useful suggestions would be generated from the fighter wings. The Deputy Commander had been told that during the latter part of 1965 this procedure had been followed. ^{63/}

He admitted, as did all the pilots, that strengthened enemy ground defenses and recent high loss rates were a primary reason for the concern. He added that this was all the more reason for exploring all avenues for possible improvement. If the above procedure were permitted, he felt that a greater degree of operational effectiveness would result from increased initiative and enthusiasm on the part of pilots. ^{64/}

POL Strikes

The attacks against POL facilities in the Hanoi/Haiphong area during June initiated a dramatic new phase of air power application in the Vietnam conflict. In some parts of the world, and also among certain sectors of the U.S. public, it was viewed with alarm as being yet another escalation toward total war. But, after months of limited harassment of North Vietnam's supply routes, it was inevitable that consideration be given to striking the enemy's sources of supply. Until June, "safe areas" had been permitted within a 30-mile radius around Hanoi and a 10-mile radius about Haiphong port and these had only occasionally been breached. The limitations against bombing the Hanoi/Haiphong POL Complex had allegedly been based on two factors: (1) The strikes would imperil the civilian population in the vicinity of the facilities and (2) it would subject South Vietnam to possible retaliatory attacks. Actually, the NVN zonal restrictions were based on broad matters of national policy rather than fear of retaliation on RVN sites. Heavy damage could be inflicted by air attacks on NVN POL sites, while the enemy could only reciprocate with limited damage in RVN. For example, an attack on Nha Be POL facilities, near Saigon, would have a

damaging effect on overall FWMAF efforts and, particularly, the civil economy in the Saigon area. It would not, however, have the profound impact of a concerted effort against NVN POL areas. Also, by January 1966, security of Nha Be had been improved to such an extent that estimates allowed no more than 50 percent destruction by major attack. Military forces in the RVN were no longer dependent upon Nha Be as a single source of supply -- floating storage facilities were provided and increased the capacity at many locations, and tankers and barges had improved POL transport assets. ^{65/}

For months before final receipt of authorization to strike the Hanoi/Haiphong POL complex, CINCPAC and COMUSMACV had been recommending its inclusion on the target list on a priority basis. In a personal assessment to CINCPAC, on 5 June 1966, COMUSMACV observed that the improving South Vietnamese political situation had undoubtedly generated acute disappointment, possibly even dismay in Hanoi and thus must be credited with producing important psychological gains for the U.S. Along with this development was the strong likelihood that the air campaign against enemy LOC's and associated logistics systems, in the Laos Panhandle and southern portions of North Vietnam, had taken a heavy toll in war-sustaining resources. Again, the U.S. had made significant psychological and material gains into what could become truly important dividends by compounding the enemy logistics problems and further eroding his morale by inflicting a telling blow against a critical national resource -- POL. POL was selected by virtue of the far-reaching effect its reduced availability would exert on enemy

conduct of logistics operations. The choice of targets was further influenced by recognition that added delay in the conduct of decisive strikes against major enemy POL storage areas would make later efforts less effective in the light of Hanoi's on-coming program of POL dispersion. Against this background and rationale, and with cognizance of improving weather in NVN, COMUSMACV urged earliest possible engagement of JCS targets as follows: POL storage in Haiphong, Hanoi, Nguyen Khe, Phuc Yen, all POL storage targets included in the JCS list held in abeyance with the 66/ ROLLING THUNDER 50 program.

On 6 June, CINCPAC again recommended to JCS that strikes against key POL facilities in NVN be given highest priority and reiterated the advantages to be gained from such strikes. He recommended inclusion of Phuc Yen POL Storage (14,000 metric ton capacity) as an additional target. CINCPAC concurred with COMUSMACV that prompt strikes against these targets would indicate to South Vietnam the U.S. intention to increase pressure against NVN aggression. They would also serve to enhance the RVN political situation by underscoring the U.S. resolve to continue support of the RVN government. Destruction of major storage areas would greatly complicate bulk off-loading at ports and necessitate new methods of off-loading and transshipment, causing at least a temporary halt in the flow of POL to dispersed areas. Since POL imports were not sufficient for the existing fleet of trucks, destruction of POL storage would further limit use of trucks and motorized watercraft. These strikes could have a critical impact on Hanoi planning at a time when they may have been hopeful of seasonal success in

mounting operations from Laos and Cambodia. CINCPAC considered North Vietnam's POL system a most lucrative target from the standpoint of impairing the enemy's military logistics capability. He recommended immediate action to exploit those advantages which were particularly timely and significant. ^{67/}

Authorization was granted on 16 June 1966 to conduct armed reconnaissance strikes on dispersed POL sites in NVN as contained in the ROLLING THUNDER 50 target lists. Sites to be excluded were those located within 30 nautical miles of the center of Hanoi, ten nautical miles of the center of Haiphong or in the buffer zone, 25 nautical miles from the Chicom border east of 105° 20'E and 30 nautical miles west of 105° 20'E. ^{68/}

On 22 June, JCS further directed that, effective at daylight on 24 June, air strikes were to be conducted against the following targets in North Vietnam for which prior planning had been accomplished:

<u>JCS Tgt. No.</u>	<u>Name</u>	<u>BE Number</u>
48.	Haiphong POL Storage	616-0005
49.	Hanoi POL Storage	616-0116
51.	Nguyen Khe POL Storage	616-0630
51.11	Bac Giang POL Storage	616-0234
51.31	Do Son POL Storage	616-0081
51.14	Viet Tri POL Storage	616-0319
51.17	Duong Nam POL Storage	616-1176
	Kep EW/GCI Radar	616-7235

Strikes against these ROLLING THUNDER 50-Alpha targets were to commence with initial attacks against JCS Targets 48 and 49, on the same day, if operationally feasible. Every effort was to be made to achieve operational surprise. Therefore, the initiating attacks were not to be conducted under marginal weather condition but rescheduled when weather would assure success. Follow-on attacks against ROLLING THUNDER 50-Alpha targets were to be executed as operational and weather factors dictated. In conducting attacks on the Haiphong target, damage to merchant shipping was to be avoided. No attacks were authorized on any craft in the Haiphong area unless they fired upon us first and were clearly of North Vietnamese registry. In addition, the piers serving JCS Target 48, Haiphong POL Storage, were ^{69/} not to be attacked if a tanker was berthed off the end of the pier.

It was learned that the Soviet tanker "Komsomol" was at the Haiphong port, presumably anchored off the pier at the POL facility and discharging its cargo. CINCPAC made it clear that strikes of the Haiphong POL storage area were authorized despite the presence of the tanker. However, no strikes of the servicing pier were to be made if the tanker was anchored and offloading its cargo. ^{70/}

In view of the weather forecast for June 24, 7th AF informed PACAF that it did not consider it feasible to strike JCS Target 48 on that date. However, in order to be prepared in case the forecast was wrong, 7th AF issued instructions to strike units to enable them to make necessary preparations. The 7th AF recommended weather minimums of 10,000 feet and five miles, vice 8,000 and five miles. It also requested PACAF concurrence for

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Haiphong Port
Fig. 16

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7AF giving the final "go-no-go" for the TF-77 and 7AF as had been the practice in the past. 71/

CINCPACAF and CINCPACFLT were requested to provide two daily weather forecasts for the following day's target area. The forecast would conclude with a tentative "go" or "no-go" for specific targets. It would be a coordinated 7th Fleet - 7th Air Force report and would be submitted via telecon by 7th Air Force, action NMCC and CINCPAC, with information copy to CINCPACAF and CINCPACFLT. If any significant weather changes occurred between the reporting times that indicated a change in the tentative "go-no-go," a special weather forecast was required. 72/

CINCPACAF advised 7AF that he imposed no objections to striking all three targets at once, provided effort on JCS 49 was not diluted. It was suggested that weight of effort on initial strikes be maximum possible, within the limits imposed by possible losses and sound mission tactics. PACAF authorized 7AF to plan restrikes on all targets, as required, and also recommended that the Navy's request for nearly simultaneous TOT's be honored, if practicable, although identical TOT's were not required. PACAF agreed it would be desirable for 7AF to have "go-no-go" for the initial strike to avoid last minute confusion. Since the Navy had asked for a delay until 25 June, there would be additional time to thoroughly plan the mission. The JCS had advised that extraordinary demands for information on the strike program could be anticipated and 7AF was requested to insure that all strike plans, including frag orders, post strike reports and strike evaluations, be furnished PACAF without delay. The JCS had also

requested that every means be taken to secure good, prompt BDA of targets struck. Efforts would be made to provide jet aircraft pick-up immediately following film processing in order to expedite dispatch to Washington. Maximum effort was to be made to get full film coverage of actual strike by utilizing Type-4 pods on strike and photo-chase aircraft. 73/

CINCPACAF pointed out that it was imperative for 7AF to make a superior showing since these targets represented a new order of magnitude in both the political and military realm. The results of this mission could dictate whether authorization would be granted to hit other worthwhile targets in the Hanoi area. It was recommended that 7AF employ successive flights, if necessary, to achieve high levels of destruction on Target 49 which would be the focus of attention in Washington. PACAF advised adoption of a concept similar to that employed in the Yen Bay attack which had been superb. It recommended taking a position with the Navy that marginal weather conditions should be ruled out and only a high-confidence forecast be used as the basis for attack. 74/

The decision to carry out strikes against POL targets in the Hanoi/Haiphong area was made after the SecDef and the JCS had given assurances to higher authority that every feasible step would be taken to minimize civilian casualties associated with the strikes. CINCPAC was advised not to initiate the program if the missions could not be executed to accomplish this objective while destroying the targets and protecting U.S. crews. Measures to be taken to minimize civilian casualties were to include: (1) Maximum use of individuals most experienced in conducting ROLLING THUNDER

operations in the Hanoi/Haiphong area; (2) detailed briefing of pilots stressing the need to avoid civilian population; (3) the striking of targets only when weather permitted visual identification of the target and provided for improved strike accuracy; (4) selection of the best axis of attack to avoid populated areas to a maximum extent feasible; (5) maximum use of ECM support to hamper SAM and AAA fire control which would limit pilot destruction, in order to improve delivery accuracy; (6) maximum use of weapons with characteristics providing highest precision of delivery consistent with mission objectives; and (7) limitation of SAM and AAA suppression to strikes against sites located outside of populated areas. Special precaution was requested to insure security of information pertaining to these operations. ^{75/}

Extremely tight communications channels were established and specified in an operations order and other preliminary and planning message traffic related to the Hanoi/Haiphong POL strikes. Messages were dispatched by special category exclusively for SecDef and JCS. Separate operations orders were sent with standard security classification to the usual addressees. ^{76/}

Poor weather and holds in the execution by JCS prevented the strikes from taking place for several days. Finally, in a flash message dated 28 June 1966 (Saigon time), CINCPAC authorized POL strikes in the Hanoi/Haiphong areas against Targets 48 and 49, if operationally feasible. Striking one of these targets would not be delayed should it be necessary to cancel the other. Timing for follow-on strikes against other targets of ROLLING THUNDER 50-A would be at the component commander's discretion. All preliminary and planning message traffic, including Operation 1 and 2 Reports

related to these strikes, would be classified TOP SECRET, special category. Addressees would be limited to CINCPAC, JCS and CINCPACAF. There would be no traffic other than in military channels. 77/

The USAF and Navy, in a coordinated ROLLING THUNDER 50-Alpha mission, struck at the Hanoi petroleum storage area on June 29. The USAF attacking force consisted of 24 F-105's, supported by eight F-105 IRON HAND, 24 F4C and two F-104 MIGCAP and Escort, and four EB-66 ECM aircraft. One F-105 was lost leaving the target area, and one MIG-17 was shot down by an IRON HAND F-105 as it departed from the target run. U.S. forces expended 188 750-pound bombs on the target. Of 32 tanks in the facility, only two remained standing and two were lightly damaged. It appeared, however, that all tanks had burned out. Bombing accuracy on this facility was exceptional and only 20 (possibly 22) bombs were out of the target area. All the bombs out of area fell in open rice fields except for the destruction of five civilian huts which were within 300 feet of the targets. Five or six bombs which fell in the southwest corner of the Hanoi Army Barracks and Supply Depot destroyed or damaged approximately four buildings. 78/

As a result of the 29-30 June strikes against the Hanoi and Haiphong POL facilities which had an estimated capacity of 179,000 MT, 101,700 MT (56.8 percent) was destroyed. Including the USN strikes of 1 July, it was estimated that about two-thirds of the total NVN POL storage capacity was destroyed in the three-day period. 79/

The U.S. government had anticipated the world-wide interest which the

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Hanoi POL Storage Strike
Fig. 17

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POL strike would generate and was prepared to explain its stand, both in Washington and Saigon. The Secretary of Defense declared that the long-immune petroleum centers at Hanoi and Haiphong had been bombed on 29 June because NVN had begun dispersing vital fuel supplies of growing importance to the war. He said that "the strikes against these petroleum facilities were initiated to counter a mounting reliance by North Vietnam on the use of trucks and powered junks to facilitate the infiltration of men and equipment from North Vietnam to South Vietnam."^{80/}

In conjunction with the strikes on POL facilities, CINCPACAF requested authority to conduct operations against additional targets which would insure optimum planning flexibility in carrying out RT 51 objectives. He recommended strikes against the Thai Nguyen Iron and Steel Combine, and its iron ore processing plant, in order to impede production of POL tanks, bridge sections and other LOC-associated repair equipment. He noted that the Hanoi Transformer Station was one of the key elements in the NVN power grid system. The destruction of the enemy's largest transfer and switching station would deny Hanoi significant power transformer and transmission capability and the ability to shunt electricity to critical consumers. He also recommended the following targets: Yen Vien and Kinh No Railroad Classification Yards; Haiphong West Railroad Yard; Hanoi Railroad Car Repair Ships; the Van Dien Vehicle Depot; Hanoi Motor Vehicle Repair and Kinh No Vehicle Maintenance Area. CINCPACAF stated that attacks against these targets would impede transfer of POL assets and further disrupt the LOC system. They would also increasingly isolate Hanoi and Haiphong and disrupt the flow of military equipment through these cities and their

~~TOP SECRET NOFORN~~

environs. He pointed out that the targets were located away from major population centers and that civilian casualties would be minimal. ^{81/}

Although the Hanoi-Haiphong POL strikes dominated the headlines, other aspects of ROLLING THUNDER were not neglected. On 25 June, COMUSMACV stated a need for additional surveillance and interdiction efforts in Route Package II. Based on recent intelligence reports that significant NVN forces and weapons had entered Laos via the Nape Pass, he recommended to CINCPAC an interim program of intensified interdiction of the pass. CINCPACFLT said that, in weighing the implications of this intelligence, he believed that several points had to be taken into consideration. He did not consider Route 8, south of Lak Sao, as being currently truckable, nor had it been truckable for several years. This fact had been confirmed by recent PACAF intelligence. CINCPACFLT noted that COMUSMACV's request for additional surveillance and interdiction was based on intelligence of questionable reliability. He stated that his forces were reconnoitering and seeding Nape Pass on a daily basis, as weather permitted. No vehicular or personnel sightings had been reported during June, although the route did show evidence of usage. Priorities assigned to Navy efforts against the NVN LOC network and other target systems were carefully weighed and constantly re-examined to insure that they remained in consonance with overall CINCPAC concept and that they were responsive to all available hard intelligence. Therefore, he felt that a better return for ordnance expended would be provided by placement of the primary effort on those areas directly related to known enemy movements southward. CINCPACFLT did not concur with COMUSMACV's

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request for additional surveillance or interdiction nor did he feel he could do so until further and more meaningful intelligence indicated substantial movement was possible from Lak Sao southward on Route 8. He stated that routine reconnaissance and seeding of Nape Pass would be continued and strikes made against appropriate targets along Route 8. 82/

Summary

As 1966 reached its mid-point, military authorities reviewed and analyzed the progress achieved by ROLLING THUNDER. At the Honolulu Requirements Planning Conference, held in June 1966, CINCPAC concluded that North Vietnam was increasing its support of the war in South Vietnam. He noted that the air campaign against the North had made it more difficult for the enemy to infiltrate men and materials into South Vietnam but it had not sufficiently reduced NVN's capability to do so. Since mid-year 1965, the enemy had dispersed and concealed many of its high value war-support resources. This made them difficult to find and even harder to destroy. During this time, the enemy had built up stockpiles in North and South Vietnam. In addition, he had vastly increased his air defenses and had refined his support organization. Moreover, the enemy had increased his ability to effectively direct, control and coordinate ground force tactics in South Vietnam at the division and higher levels. It was very significant that the enemy, by mid-year 1966, had attained the capability of fielding and supporting more maneuver battalions in the South than had been heretofore estimated by CINCPAC. Therefore, he said, intensified air efforts were necessary to reduce North Vietnam's capability to direct and

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support the war in South Vietnam. Such an intensified air campaign should be directed toward proper objectives. Ground forces would have to be augmented beyond current requirements if the enemy's capability to field and support combat units in South Vietnam was not sufficiently reduced. ^{83/}

CINCPAC pointed out that, during the first half of the year, only a limited portion of the concept for an effective air campaign, promulgated in January 1966, had been carried out. This was armed reconnaissance in southern and northwestern North Vietnam and in Laos, along with very selective route interdiction in the northeast area. He emphasized the most important elements of the concept had not been authorized, as of mid-year 1966. These were the denial of external assistance through closure of the major ports and heavy interdiction of LOC's leading from China, coupled with the destruction in depth of those resources which supported aggression, particularly POL. ^{84/}

During the first half of the year, some 20,000 sorties had been conducted against proposed targets in the southern and northwestern areas of North Vietnam. He said that over 99 percent of the operations had been armed reconnaissance missions concentrated primarily on dispersed enemy facilities and LOC's involved in moving supplies and people to South Vietnam. While the air concept outlined in January 1966 remained basically the same, the requirements for sorties in North Vietnam had increased to 11,200 per month. The plan was still to apply a relatively constant number of strike sorties against carefully selected and sensitive target systems. At this juncture, CINCPAC said that the successful pursuit of military objectives

required that the ROLLING THUNDER operations be oriented toward the achievement of three basic tasks: ^{85/}

- OBIS {
1. Reduce/restrict North Vietnamese assistance from external sources.
 2. Destroy in depth those resources that contributed most to support aggression.
 3. Harass, disrupt and impede movement of men and materials through southern North Vietnam into Laos and South Vietnam.

In looking towards the second half of 1966, CINCPAC said that the weight of effort to be applied to the basic tasks for ROLLING THUNDER had to be carefully balanced to achieve the most effective results from the sorties expended. The three tasks given for the ROLLING THUNDER operations were interrelated and had to be accomplished simultaneously for maximum effective results. He noted that, while certain operations would be more productive than others, concentration on one at the expense of the other would reduce the overall effectiveness of air operations. The greatest impact on North Vietnam would be the reduction of support from external sources and the destruction of in-country high value resources. Armed reconnaissance would be less productive of meaningful destruction, but it would help keep the lines of supply disrupted and would impede movement. He added that, by concentrating available armed reconnaissance against selected elements of the enemy LOC system and his dispersed and hidden support facilities, increasingly effective results could be expected. ^{86/}

CINCPAC further stated that the reduction of external support would require interdiction of water and land LOC's, which were being used to

receive, distribute and transport war-making material from external resources. The interdiction effort would be a combination of attacks against the major port facilities and key bridges on the northern LOC's. Moreover, armed reconnaissance along these LOC's would emphasize the destruction of dispersed and hidden support facilities, such as POL and military supplies. 87/

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CHAPTER III - OPERATIONS, JULY-DECEMBER 1966

Air Action Intensified

During July, tactical air strike activity reached its highest level since the start of the conflict. There was also a marked shift in emphasis from Laos operations to North Vietnam, particularly in RP I. Operation TALLY HO was initiated in the southern part of RP I, as extension of the TIGER HOUND operation in Laos, to combat infiltration through the DMZ. The authority to strike military targets in the demilitarized zone, plus continued emphasis on POL strikes, indicated U.S. willingness to expand the use of airpower. The Joint Chiefs of Staff increased the overall interdiction program by about 25 percent to 10,100 sorties, effective 9 July. They authorized Alpha strikes against four new highway/railroad bridges and at the same time reverted ROLLING THUNDER 50-Alpha targets, with the exception of the Hanoi and Haiphong POL storage area, to armed reconnaissance interdiction. Hanoi/Haiphong POL could be struck only when the strike plan was cleared through the JCS. Although there was some weather improvement in North Vietnam, the more lucrative areas of RP's V and VI remained under poor weather conditions. Adverse weather and increasingly intensive defensive fire in these areas made effective armed reconnaissance on the northeast and northwest rail lines out of Hanoi extremely hazardous. ^{1/}

Evaluation

During a conference at CINCPAC, on 1 July, attended by the Secretary of Defense, an evaluation was made on the progress achieved by mid-year in

meeting the goals established at the Honolulu Conference at the beginning of 1966. The six goals pertained to enemy attrition, denial of base areas to Viet Cong, maintaining critical roads and railroads open, increasing the population in safe areas, pacification of new areas, and the defense of all military bases. With respect to enemy forces, the goal was to weaken NVA/Viet Cong forces by the end of 1966. This attrition was to be at a rate which would be as high as the capability of the Viet Cong/NVA to put men into the field. By mid-1966, CINCPAC felt this goal was unlikely to be achieved. This was because the enemy had demonstrated the ability to increase its forces despite the losses sustained. The Defense Secretary asked why CINCPAC did not include the wounded in the confirmed average enemy monthly losses of 6,100. The accepted monthly average infiltration figure was 6,900, plus the 3,500 recruited in-country monthly. The validity of the figure of 6,900 was questioned by the Defense Secretary, who cautioned against reliance on such statistics. However, he agreed that the Viet Cong/NVA were probably increasing their forces. ^{2/}

By mid-year, predictions of aircraft losses were found to be in need of re-analysis. Actual losses were not following the projected losses; USN losses were higher and USAF losses were lower than estimated. The Secretary of Defense felt this difference in loss rate could be attributed, in part, to the differences in target area assignments. He believed that CINCPAC could influence loss rates by reassignment of target areas. The Defense Secretary pointed out that problems could arise due to the long lead times involved. It was concluded that the selective rearranging of targets, to

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regulate attrition, might not be practicable. ^{3/}

The Defense Secretary queried CINCPAC as to the steps being taken to strangle the NVN POL supply. CINCPAC informed him that several measures were under consideration. Operations would be intensified on all elements of the rail line leading south of Hanoi. Coastal reconnaissance also would be intensified for the purpose of destroying the lighters and water vehicles that might be used for POL transportation. All known dispersed POL facilities would be attacked on a systematic basis and priority would be given to POL associated transshipment points and truck parks. Furthermore, a plan for halting traffic on the northeast rail line was being developed. Through these measures, he felt that a reduction could be made in the import and distribution of POL to a level below that required by the enemy. However, CINCPAC stated that authority was needed to attack the military installations in the northeast area. He believed their destruction would disrupt the training, recruiting and equipping of troops in South Vietnam, and would disperse and confuse the air defense in the area. In his opinion, this would make other operations in the northeast less costly. ^{4/}

Strike Planning

During July, CINCPAC implemented a plan to accomplish maximum feasible destruction of POL while, at the same time, assuring a balanced effort against other facets of the North Vietnamese military capability to support the Viet Cong. Accomplishment of this objective involved four basic and interrelated requirements: (1) Destruction of the means by which POL was

imported into NVN; (2) destruction of known fixed POL installations; (3) destruction of transitory targets; and (4) a reconnaissance program to develop information on the overall POL system. ^{5/}

POL was being imported into North Vietnam primarily by means of ocean-going tankers through major port facilities and by off-shore lighter-age. CINCPAC specified the major storage facilities at key off-loading points, particularly in the Haiphong POL complex, as key targets for destruction. It was reported that ocean-going tankers had not returned to this complex since the initial June 29th strike. Restrikes would include destruction of the bunkering pier facilities. Strikes in the vicinity of Hon Gay and Cam Pha, close to offloading piers, would discourage tankers from using these ports as transshipment points. Caution was to be exercised to insure that foreign tankers were not in any way endangered by those strikes. ^{6/}

Information was lacking on the amount of POL imported along the coastal reefs of RP VIB and across the Tonkin Gulf direct to NVN ports. Armed reconnaissance would be conducted along these routes with strikes against cargo craft authorized in the three nautical mile limit. Surveillance would be conducted to determine if POL was being brought in directly from the Hainan/Leichow Peninsula area. ^{7/}

While there was little evidence that POL had been imported via the northeast and northwest rail/road routes, the capability existed. The use of the northeast rail line, in particular, might increase as a result of

air operations to eliminate sea imports. Strike planning was to place primary emphasis on the NE rail/road with secondary emphasis on the NW rail line. Strikes against the NW line would prevent NVN from concentrating reconstruction efforts on the NE rail line and would also split the defense effort. The objective was to keep two or three points on the NE rail line and on the parallel road routes interdicted at all times, primarily through destruction of key bridges. ^{8/}

With respect to fixed POL targets, it was estimated that about 90,000 metric tons capacity existed in tank complexes with perhaps as much as 5 - 10,000 additional metric tons stored in semi-permanent drum storage areas. Of the tank storage, an estimated 71,000 MT was contained in JCS numbered targets. All of these JCS targets had been struck (except Phuc Yen - 14,000 MT and Kep - 800 MT) which left approximately 57,000 tons (or about 50 percent of the total known POL) as residual in previously struck JCS targets. ^{9/} Strikes were programmed against nine targets with residual POL value.

Destruction of transitory targets, such as watercraft, rolling stock, trucks, transshipment points, and temporary storage areas would also help suppress POL distribution. ^{10/}

POL reconnaissance requirements would be met largely through regularly scheduled recce flights into areas of major interest, rather than specific point targets. Intelligence was needed on the extent to which route, rails and waterways in the north and northeast were being used to move POL. Known POL targets of value would be scheduled for coverage to update residual

value in the event they had been previously struck. 11/

While extent to which POL had been dispersed was not exactly known, it was certain that Hanoi had given this project a high priority. It was necessary to prevent new POL supplies from entering the country and to find and destroy dispersed stock. The latter task, although time-consuming, 12/ would assure gradual attrition if replenishment was kept to a minimum.

The 7AF recommended restrikes of priority one POL targets interspersed with strikes on the NE and NW rail lines to maintain interdiction. These priority one POL targets would be restruck every other day to allow for BDA. Task forces would penetrate NVN defenses in the morning and again in the afternoon. For tactical deception, an occasional 24-aircraft force would be massed to strike hard targets within 30 miles of Hanoi. Night armed reconnaissance would generally be scheduled before midnight to take best advantage of weather forecast for this season. TOT's for any particular strike would span 20-30 minutes. Small targets would be hit by one flight of four aircraft and large targets by flights of four, with a TOT spread of approximately five minutes between flights. Multiple attack headings would be used where feasible. 13/

High-level concern was expressed over the bombing of two unauthorized JCS targets - the Thai Nguyen Thermal Power Plant (JCS 82.16) and the Viet Tri Thermal Power Plant (JCS 82.17)-during July. Analysis of BLUE TREE photography (8 July) revealed damage to JCS 82.16 and photography of 19 July showed that the transformer of the Viet Tri Power Plant had been

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Thai Nguyen Thermal Power Plant Strike
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damaged. Aircrew debriefings of flights which had struck targets in the vicinity of JCS 82.16 and 82.17 indicated that accidental bombing could have occurred during attacks on nearby targets. The inadvertent strikes appeared to be the result of intensive enemy ground fire and not poor mission preparation, lack of professional skill or carelessness. The 7AF Commander re-emphasized, to all wing commanders concerned, the importance of target study, accurate reporting, and the absolute necessity of avoiding attacks on unauthorized targets. ^{14/}

The possibility of moving the Dixie Station carrier north to support out-of-country air efforts in ROLLING THUNDER Route Packages II, III and IV was under study in July. The Commander, 7AF, informed CINCPAC that the study would include an analysis of the present sorties effort by the Dixie Carrier, the effects on in-country coverage, effects of U.S. capabilities in SVN, sortie efforts out-of-country and other factors. He brought out one point which implied the F-105's would have to be moved from II CTZ to III CTZ to help make up the loss of sorties currently being run by Dixie in III and IV CTZ. No definite conclusions were reached during the briefing on the feasibility and plausibility of moving the Dixie Station. The 7th AF stated that contingency plans depended at that time on the assistance offered by the CVA. Additional squadrons, which were to arrive in South Vietnam during August, would offset the loss of the CVA in the southern area. Seventh Air Force presented CINCPAC with the out-of-country sorties for April and June as follows:

<u>Element</u>	<u>April</u>	<u>June</u>
Air Force	5,267	6,976
Navy	3,735	3,196
USMC	1,364	926

Out-of-country sorties requirements, as of mid-year, were 16,200 per month, ^{15/} a shortfall of around 3,400 sorties per month.

Subsequently CINCPAC informed COMUSMACV that an increased sortie capability was required in North Vietnam which could best be accomplished by moving the Dixie CVA to Yankee Station on 1 August. He stated that this decision had been reached after analyzing the increased requirements in ROLLING THUNDER, including the effort that COMUSMACV had requested south of Vinh. At the current rate, they would fall considerably short of the 10,000 sorties authorized for Laos and North Vietnam. He said these sorties were needed, not only to meet the interdiction program COMUSMACV had requested, ^{16/} but also to make more rapid progress in the POL campaign.

COMUSMACV requested a delay in moving the Dixie CVA until 4 August. CINCPAC agreed and instructed CINCPACFLT to support COMUSMACV from Dixie Station and, commencing 6 August, to maintain three CVA's in the vicinity of Point Yankee. ^{17/}

The intensive air effort against the POL storage capability of North Vietnam, which started at the end of June, continued during August. By the end of the month, the USAF had destroyed 68 percent of the identified

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oil storage capacity authorized for attack in RP's I, V, and VI-A. However, new dispersed storage capacity was being discovered at a rate which approximated the rate of destruction. An intensive effort was made during the month to destroy a large amount of dispersed POL located near the infiltration routes into South Vietnam and Laos. This POL was stored in 55-gallon drums and five-gallon cans which were kept in truck parks, old bomb craters, caves, rice paddies and river banks which made it extremely difficult to locate and destroy. The number of POL-type secondary fires and explosions obtained during these attacks indicated the program was moderately successful. 18/

Interdiction of LOC's, including the northeast and northwest rail lines, was also moderately successful. However, adverse weather conditions made it impossible to maintain the desired level of interdiction against these lines. Although July and August ^{'66} were supposedly the months of best flying weather in North Vietnam, 81 percent of the sorties scheduled into RP's V and VI were cancelled or diverted because of weather. The poor weather in this area created an "overload" in RP I and resulted in CINCPAC authorizing 7AF to attack the LOC's inland of the coastal highway, Route 1A, in RP's II, III and IV. 19/

During COMUSMACV's visit to the CINCPAC, 13-14 August, the latter queried him as to the effect of POL bombings. COMUSMACV replied that it was too early to judge the full impact of the program, but there were indications the enemy had been hurt and that there would probably be stronger signs of this in the near future. COMUSMACV explained the peak air losses

during the previous week as being due to a combination of bad luck and increased Russian technical assistance to North Vietnam. CINCPAC discussed the possibility of another standdown of the air campaign and COMUSMACV urged him not to consider any cessation of the full bombing program in the North. COMUSMACV pointed out that few industrial targets existed in the extended battle area, the southern NVN Panhandle south of Vinh, and it was important that allied fire power be brought to bear on troops, supplies, and material en route to the South. An NVA division had already crossed the DMZ, emphasizing the importance of an air interdiction program to SVN ground warfare. CINCPAC listened carefully to COMUSMACV's views but was non-committal. 20/

Early in August CINCPAC recommended strikes against Phuc Yen (JCS Target 51.1) and Kep (51.18) POL Storage which had a capacity of 9,910 and 1,210 MT, respectively. This represented nearly one-third of the current estimated national capacity remaining. Since both of these targets were isolated and completely separated from nearby airfields, CINCPAC said it would be possible to execute strikes against the POL storage area without collateral damage to the airfields. These facilities were not only the primary fuel source for the NVN MIG's, but were also suspected of supporting military vehicles. 21/

CINCPAC pointed out that the cumulative effects of RT operations against land LOC's had forced the enemy to increase its use of the inland water system to transport essential military supplies, including POL. According to DIA, many of these waterways were not related to irrigation-agrarian

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functions but were used primarily for waterborne transportation. He cited, as an example, the Thanh Hoa Lock (JCS 71.11), which controlled the water level on the Song Chu Canal and was used extensively to move military supplies. CINCPAC stated that the destruction of Thanh Hoa Lock and Xom Trung Hoa Lock and Dam would seriously impede and disrupt the movement of essential military supplies and further compound the problems that currently existed in the NVN land LOC's. He estimated that destruction of these locks would deny approximately 200 miles of inland waterway to the enemy. CINCPAC, therefore, requested authorization to strike these targets and also to strike dredges in the Haiphong restricted zone, but located away from populated areas. He stated that the approaches to Haiphong required considerable dredging to permit passage of ocean vessels to the harbor. Even with dredging, during certain seasons all vessels with over 19 feet draft required partial off-loading by lighter prior to proceeding up the channel to Haiphong. He pointed out that by preventing dredging, it was probable that the majority of foreign ocean-going vessels, including tankers and cargo ships carrying packaged POL, would be prevented from entering Haiphong harbor. CINCPAC said that strikes on a fairly frequent basis against carefully selected targets within or reasonably close to Haiphong, Hong Gay, and Cam Pha port facilities should result in making foreign ships, including POL carrier, reluctant to frequent these ports. He believed a precision strike against Hong Gay Railroad Shops, warehouses, and Cam Pha POL Storage would be effective for this purpose. ^{22/}

In May, COMUSMACV had recommended that the Thai Nguyen Steel Plant be struck in retaliation for Viet Cong attacks against South Vietnamese industries.

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Although concurring with the basic intent of COMUSMACV's suggestion, CINCPAC at that time advocated strikes against POL facilities instead. However, since POL strikes had been in progress since June, CINCPAC requested authorization in August to strike the Thai Nguyen Steel Plant (JCS Target 76) and the Haiphong Thermal Power Plant (JCS 80 and 82.12). He pointed out that the Thai Nguyen Steel Combine was fabricating tanks, barges and other products directly related to the priority effort against POL. CINCPAC said that some 2,000 tanks of this type had been identified at dispersed POL facilities. When these tanks were buried and revetted, the sorties and bomb cost to achieve 50 percent probability of destruction became extremely high. In addition to fabricating tanks, the plant was also producing bridge components, including trusses, steel and pontoon sections, which were used to repair damaged LOC's and the construction of by-passes. Also, steel barges of the type being used to move POL had been identified near the 23/ plant.

CINCPAC stated that destruction of the Haiphong Thermal Power Plant would add to the problems already created in the Haiphong/Hon Gay area due to the destruction of the Uong Bi Thermal Power Plant in December 1965. Destruction of the plant would reduce the amount of power available in the Hanoi and Hon Gay area and slow-down the handling and distribution of supplies, including POL, which arrived at these ports. In addition to the important effect on NVN's war-making potential, it might deter Hanoi from further mining of ships in the approaches to Saigon. However, it was not deemed advisable to label these strikes as being in retaliation for the

successful Viet Cong mining of the freighter "Baton Rouge Victory" in the river channel to Saigon. ^{24/}

Meanwhile, the Commander, 7AF, had proposed that F-105's strike a selected target in the Hanoi Delta by utilizing the cover of darkness en-route and striking the target at first light. After careful consideration of this proposal, the Commander, 388th TFW, Korat, said that the launching, formation and refueling of flights of F-105 aircraft under night-time conditions was feasible and acceptable only under ideal weather conditions. External aircraft lighting and the current camouflage finish created unacceptable visual distortion. He believed that navigation and formation difficulties under black-out conditions would adversely affect flight integrity, flexibility, and maneuverability; and that minimum conditions for employing F-105 night formation were clear weather and some moonlight illumination. The 388th TFW Commander, therefore, recommended that the above tactic be employed, utilizing F-4C type aircraft to provide radar separation and thus insure mission success under less than perfect conditions. He added that missile warning should be provided by one F-105F Wild Weasel aircraft until this capability was available in the F-4C. ^{25/}

The Commander, 388TFW, also informed the Commander, 7AF, that most of the flight commanders were somewhat skeptical and apprehensive about a recommended ingress routing through the delta to JCS Target 51 (Nguyen Khe Petroleum). However, after examining the EOB (electronic order of battle) and noting the proposed orbit points of the EB-66's, a few of the most experienced pilots conceded that the corridor through the delta offered two

advantages: (1) It should offer minimal exposure to both flak and SA-2 threat; and (2) it was a different approach. However, a launch against Nguyen Khe on 16 August revealed that the delta corridor was more heavily defended than the EOB had indicated. Flight leaders were then unanimous in their preference for alternate routes to the target. They believed that more terrain masking was necessary, although this would require better weather in the mountains. For the present, they suggested refueling on "Brown Track" and continuing to investigate approaches through RP's III and IV, if the weather remained poor in the mountains east of Hanoi. If southern approaches did not prove feasible, then they would request that air-to-air refueling be accomplished on inland tracks and that approaches be attempted from the northeast and southwest. ^{26/}

Air strikes in September were confined largely to armed reconnaissance or attacking previously designated JCS targets in the authorized armed reconnaissance areas. The Air Force felt that POL attacks were becoming less productive as POL was dispersed. For the most part, attacking residual POL storage capability in highly defended areas was not worth the limited gain. No new target system had been authorized for attack in North Vietnam since July. ^{27/}

According to CINCPAC, there were indications that the JCS was not likely to expand the North Vietnam target base significantly until RT 51 objectives had been substantially fulfilled. This meant reducing POL capacity to the point where further priority effort was not warranted and backing up the recommendation with convincing BDA. DIA believed that

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residual POL capacity at Viet Tri (JCS 51.14) and Nguyen Khe (JCS 51.00) remained at significant levels. Both DIA and JCS viewed capacity, rather than POL residual, as essential POL measurement. Based on photography of 21 September, PACAF estimated that 325 of the original 1,400 MT remained at Viet Tri, but DIA still carried 1,320 MT; a revaluation was requested to correct this disparity. PACAF estimated that 6,680 of an original 7,500 MT remained at Nguyen Khe. The problem remained essentially one of destroying POL capacity or giving convincing proof of the lack of POL residual. PACAF, therefore, directed 7th AF, on 27 September, to obtain high resolution photography of these targets so that their true residual value could be assessed. Seventh AF was further advised to be prepared to strike both targets if BDA indicated sufficient value remaining or if there was insufficient evidence that the facility had been abandoned. ^{28/}

At a meeting between PACAF and DIA representatives on 7 October it was agreed that the residual capacity at Viet Tri was 43 MT and the target was downgraded to Category C on the POL list. Surveillance was to continue and if the installation again became an active POL strike facility, it would be incorporated into the POL strike program. The Nguyen Khe POL Facility was also downgraded to Category C. ^{29/}

PACAF Views of the POL Campaign

At CINCPAC meetings, PACAF representatives emphasized three important points regarding the POL campaign:

1. Many agencies, working somewhat independently, had expanded

POL target data bases resulting in several large, poorly coordinated and conflicting data bases.

2. The Air Force was being accused of non-performance since it was executing relatively few strikes against a very large list of POL's.

3. The POL campaign was only part of a balanced program against NVN.

A conference was scheduled in Honolulu during October at which CINCPAC and components were to agree on a master list which would identify major POL installations warranting strikes on a priority basis. Minor facilities should be considered as part of the balanced overall program of interdiction and reduction of war waging capability. To this end, CINCPAC urged all reporting agencies to avoid identifying targets as POL storage when they were only marginally POL and belonged primarily in some other target category such as truck park, military storage, etc. They were asked to avoid indiscriminate reporting of suspect POL or references to POL when strikes resulted in fires and smoke which could be attributed to some other source, and to develop rigid criteria for identifying facilities as being predominately POL. PACAF had identified 20 lucrative targets which contained approximately 82 percent of residual capacity in Air Force area. ^{30/}

Subordinate commands were again directed in November to give emphasis, on a selective basis to POL targets. Fifteen POL storage areas had been designated as priority targets within RP I, II, III and IV. However, as of 16 December, CINCPAC stated that no strikes had been executed against any of those targets which had been selected from the CINCPAC list and were considered the most lucrative POL targets within these route packages. The

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residual capacity of nine of the 15 targets had increased. Action was required since destruction of the enemy's POL system continued to be a primary objective of ROLLING THUNDER. 31/

During October, air operations continued at the controlled pace established in July. The prevailing target restrictions, combined with the weather limitations of the northeast monsoon, reduced the impact of air strikes on North Vietnam. In addition to the decreasing effectiveness of ROLLING THUNDER operations, CINCPAC was concerned by reports of another possible standdown of air strikes against North Vietnam. In a lengthy message to JCS, on 26 October, he emphasized the importance of continuing the air campaign against the North and pointed out the danger involved in reducing or suspending operations before Hanoi stopped infiltrating men and materials into the South. 32/

CINCPAC stated that self-imposed controls had adversely affected the effectiveness of airpower in reducing North Vietnam's capacity to direct and support the insurgency. Nevertheless, it had had a significant impact upon the enemy's military capabilities. Bombing had caused disruption and destruction of enemy material to such an extent as "to represent the probable balance of power which to date had denied the enemy a capability for seizing significant portions of I and II Corps." Another source stated, "The failure of the NVA forces to launch a major campaign in I Corps was attributable, in the main, to successful USMC spoiling operations. However, Operation TALLY HO significantly reduced the southward flow of material and seriously compounded the logistics problems of the NVN forces. 33/

North Vietnam had been unable to move enough military personnel into South Vietnam to accomplish this task without suffering unacceptable losses from air attacks. Enemy tactics and the terrain in South Vietnam made it inadvisable to withhold airpower until U.S. forces were engaged in close ground combat. CINCPAC believed we should begin to disrupt, harass and reduce enemy forces as far back as possible and thus "degrade his capability, quantitatively, before he reached the battlefield." He was particularly concerned with the enemy concentrations known to exist in and near the DMZ; an area from which an attack could be launched with little warning. Since the U.S. was outnumbered in this area, the security of our forces depended largely on the ability of our airpower to deny the enemy freedom of movement. Even a short standdown of air operations against enemy forces in or near the DMZ would pose grave security risks for our forces in that area. ^{34/}

CINCPAC pointed out that our air campaign was a major military activity where we had the initiative and control over the intensity of combat whereas the reverse was true in the South. Any form of a partial standdown, whether it meant reducing the targeting base or restricting air operations to small geographic areas, carried grave risks. In the past, the enemy had taken advantage of such reductions by readjusting his air defense and thus increasing our attrition. CINCPAC reiterated that our "primary objective in the air campaign against North Vietnam is to make it as difficult and costly as possible for North Vietnam to continue effective support of the VC and to cause Hanoi to cease controlling and directing the insurgency in South Vietnam." To this end, CINCPAC believed it necessary to steadily

increase pressure against the enemy until he reconsidered his support of the aggression. CINCPAC noted that increased pressure was recently applied by destruction of the NVN POL system. That program had resulted in destroying, greatly reducing the capacity or forcing the abandonment of all major POL targets authorized for attack. But, CINCPAC pointed out, in recent weeks our pressure on the enemy had not continued to increase but, in fact, had decreased. He stated that airpower was not being used to maximum effectiveness and there were many lucrative targets which should be attacked to increase pressure on the enemy. ^{35/}

Broadening the Target Base

CINCPAC recommended a "broadened target base, designed to lead Hanoi to expect attacks anywhere, at any time, against any type of military target or activity that supports their aims." He noted that JCS plans for RT 52 were a first step toward this broadened target base and would increase pressure on NVN but would still not use airpower to its maximum effectiveness. CINCPAC felt this was the time to "tell Hanoi that no military target, no activity that helps sustain the NVN effort to prosecute the war, is free from attack." He believed that any continued relaxation of air pressure would cause North Vietnam to increase its support of the insurgency in SVN and cause our allies to consider us irresolute in our determination to force Hanoi to stop its aggression. Thus, the Communists would be encouraged to increase their disruptive efforts throughout Southeast Asia. CINCPAC believed we had to convince Hanoi that the negotiating table was its best hope. This could be best achieved by broadening the target base.

CINCPAC recommended that RT 52 be implemented immediately and that further broadening of the target base be authorized at an early date. ^{36/}

A briefing delivered by the J-2, CINCPAC, to the Secretary of Defense in October, reiterated many of the points made by CINCPAC in his message to the JCS. The J-2 emphasized the need for attacking a broadly-based target system which would deny sanctuary to the enemy.

He believed that targeting without stereotyped pattern and with flexible tactics was essential to productive operations. He stated that continuous interdiction should not be attempted on logistic facilities, but that they should be attacked on a carefully preplanned basis. In the northeast the U.S. had been losing aircraft at about eight times the average rate of all other areas, per 1,000 sorties, but he did not recommend reducing operations to reduce losses. He believed that the costs to the enemy could be increased, while decreasing our loss rate, by striking 14 JCS target nominations for RT 52 which were located in the northeast. The J-2 strongly supported this recommendation as the core of operations in that area. Eighty-seven additional targets had been carefully selected to round out this concept. The categories of targets included 22 additional JCS-numbered targets, most of which were key military training, supply and ammunition sites, whose destruction or disruption would further complicate military functions. The list also included the remaining significant POL targets. Some of the targets selected, located in currently prohibited areas, formed functional groupings for greater total effect when they were brought under attack. Targets were isolated from surrounding built-up

civilian areas and it was believed that those situated in currently restricted areas could be hit without fanfare. ^{37/}

It was planned to continue emphasizing disruption and attrition on a selective and concentrated basis with fleeting targets of all types remaining prime objectives. However, large-scale operations would be concentrated against carefully selected enemy centers of activity. This program had already produced highly significant results, such as the recent operations against the Thanh Hoa and Ninh Binh logistics centers which had revealed a major enemy defense deficiency that could be exploited. It was found that continuous attack against confined areas soon caused the obviously limited enemy antiaircraft munitions to become exhausted, thus permitting operations to proceed against very lucrative targets with little enemy fire. The J-2 believed these concentrated operations would not only have an important psychological impact on urban areas, but also the cumulative impact would have interacting effects. It was his opinion that attacks of this type would do much more to disrupt and harass movement than the previous effort expended on "bridge busting and road cratering." ^{38/}

COMUSMACV said that the cessation of bombing would have an adverse psychological effect on our allies fighting in Vietnam as well as permitting the enemy to move men, material and supplies into the South with impunity. He believed it was time for a change in strategy and gave two possible courses of action: (1) moving to shock action by striking, over a short period of time, lucrative targets that would hurt the enemy and convince him that U.S. power did not have to be restrained; and

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(2) elimination of these same targets on a well-programmed but graduated campaign - as opposed to shock action - to be followed by a level of operations that the U.S. could sustain. He stated that, even with elimination of any initial group of lucrative targets, it was doubtful whether the required effort could be supported without greater flexibility in target selection. COMUSMACV recommended the following targets, in the general priority listed:

1. Large motor maintenance facilities which supported enemy's transportation system regardless of their location. A particularly lucrative installation existed inside the Hanoi ring.
2. The SA-2 missile assembly area, also inside the Hanoi ring.
3. The Haiphong port with emphasis on the dock area. He believed this target could be destroyed without jeopardizing foreign bottoms in major degree.
4. Thermal power plants complex - approximately 12 installations.
5. The MIG air bases, to include supporting facilities and fighter craft.

COMUSMACV recommended that the above targets be hit before any consideration be given to a bombing cessation. He also stated that any change in the bombing program should avoid restrictions on strikes in the extended battle area; i.e., the area from Quang Tri Province north to Vinh. ^{39/}

Despite authorization for expanded targeting, air activity in North Vietnam during November declined markedly due to adverse weather. The JCS authorized 13 additional targets for strike in conjunction with ROLLING

THUNDER 52, which started 12 November, but only two of the authorized USAF and two Navy JCS targets were struck. Efforts to strike other targets were frustrated by intensification of the northeast monsoon which affected all route packages in North Vietnam. ^{40/}

During the northeast monsoon, the STEEL TIGER (SL) area enjoyed relatively good weather while Route Packages I, II, III, and IV of ROLLING THUNDER were usually marginal for air operations. The reverse was true during the southwest monsoon period. CINCPAC provided for these contingencies by allowing weather divers to be conducted into other areas of responsibility. CINCPACFLT informed COMSEVENTHFLT, on 11 November, that since TF 77 forces probably would not be able to utilize their full capability in North Vietnam, they could be expected to divert increased numbers of flights into the ROLLING THUNDER area during the southwest monsoon period. As this had been the practice in the past, 7AF redirected about 1,500 sorties per month from RP I into II, III, and IV. Scheduled operations would be coordinated by CINCPACFLT, or his designated representative, so as to avoid interference of forces in the conduct of their missions. It was realized that intermixing of TF 77 and 7AF sorties, within the limited route package area, would require close coordination by both forces. It was, therefore, necessary to insure that 7th AF was appraised of and could operate within established TF 77 procedural rules. ^{41/}

Further details of coordination were worked out at a meeting, on 24 November, attended by CTF 77 and the Vice Commander 7AF with their respective staffs. The 7AF was to select target nominations in Navy Route

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Packages from a mutually agreed list and submit them to CTF 77. After review, CTF 77 would compile and dispatch an approved target list. The AF wanted at least 120 targets to allow some flexibility in planning one month's operations. It would then request periodic target list updating, depending upon strike results and newly developed targets. Details were also clarified with respect to reporting, TOT's and exchange of BDA photography. The Commander, 7AF, retained the prerogative of diverting all or 42/ any part of his force into Air Force assigned areas of responsibility.

"Combat Beaver"

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In November, JCS proposed a concept of air operations against North Vietnam to be known as COMBAT BEAVER and requested CINCPAC's evaluation of its feasibility and effectiveness. CINCPAC agreed with the need for an intensive air campaign against the North which carried operations into all areas against the most important military and military support facilities and activities. The COMBAT BEAVER concept called for selective interdiction of key logistic hubs as a means of providing opportunities for follow-on aircraft to strike enemy material and equipment. The CINCPAC pointed out that, in these respects, the concept was basically the same as the current ROLLING THUNDER operations, but that it departed substantially from the CINCPAC concept in its emphasis on route interdiction and surveillance in RP's II, III, and IV. He pointed out that a tight interdiction program well north in North Vietnam would be too costly in sorties and the predictable pattern of operations would generate a high loss rate. 43/

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CINCPAC believed that the greatest direct or indirect impact upon the enemy could be had from constant and unpredictable attacks upon known and suspected enemy military facilities and activities. Such attacks would provide the greatest assistance to the barrier and proven FAC and CRICKET operations in Laos. He felt that placing emphasis on interdiction in NVN, as visualized in the COMBAT BEAVER concept, would upset the currently well-balanced program. With the implementation of the barrier, changes in weight of effort for particular areas would be required depending on enemy reaction. CINCPAC felt that the feasibility of utilizing FAC and ABCCC aircraft north of RP I was highly questionable. Their survivability in primary target areas such as Vinh, Thanh Hoa, Phylly and Nam Dinh was questionable at any time; their use might be feasible in remote areas only until the enemy counteracted.

CINCPAC stated that the B-52 concept of continuous interdiction of key passes was considered feasible with current assets, but would probably result in a decrease of strike effort against normal ARC LIGHT targets. He pointed out that the enemy could be expected to deploy SAMS to cover these areas in a very short time. COMBAT BEAVER stressed the "need for an integrated, closely-controlled program of surveillance and interdiction." CINCPAC noted that our current interdiction program was a well thought out, critically supervised and balanced program which got closest attention at all levels of command. He pointed out that control and coordination procedures were adequate and closely supervised by CINCPAC. ^{44/}

Under the ROLLING THUNDER balanced concept, in addition to stressing interdiction, emphasis has been placed on the need for a broadened target

base on the theory that the most efficient way to interdict is to strike at the source. He pointed out that the best method available for increasing effectiveness was not intensifying the interdiction program but striking highly lucrative source targets. While the target base had been broadened, the lucrative targets of war-making potential and support were still off-limits. He concurred in the need for new, improved munitions and an improved night and all-weather capability as essential to greater effectiveness. He concluded that the COMBAT BEAVER program, with few exceptions, closely paralleled what was currently being done, and did not feel it would increase the overall effective use of U.S. forces in SEA. ^{45/}

Psywar and "Fast Buck"

Operation FAST BUCK, another operation proposed by JCS in November, was for the purpose of inducing the defection of North Vietnamese pilots. It was to be patterned after Operation NOLAH used during the Korean War when the U.S. offered \$50,000 to any Communist pilot who would deliver a MIG to UN forces plus a \$50,000 bonus for the first pilot to do so. The program also offered the pilot political asylum. As a result of the offer, all Communist MIG aircraft were grounded for eight days, ostensibly to verify pilot reliability. After the grounding, fewer MIG aircraft took to the air and engaged in air operations against our aircraft. JCS suggested a similar program for North Vietnamese pilots for the purposes of:

1. Securing aircraft, particularly the MIG-21 and the "Hook" helicopter.
2. Acquiring pilots for intelligence exploitation.

[REDACTED]

3. Causing North Vietnam air force to evaluate loyalty of pilots.

4. Reducing MIG radius of operations and number of sorties.

5. Psychological exploitation of pilots in Vietnam and other countries.

In order not to alert the Soviets to the priority of our requirements, the leaflets were to emphasize "defection" rather than "aircraft."^{46/}

In evaluating Operation FAST BUCK, CINCPAC considered it both feasible and desirable and suggested the offer be a combined US/GVN undertaking to include other free world countries, if they so desired. No difficulties were expected from Thailand in carrying out the program. In-flight and landing procedures had to be uncomplicated and coordinated by all air traffic control agencies involved. CINCPAC suggested that all available media be employed to disseminate the information overtly and that covert means also be used. He felt the offer should include all aircraft, without distinction, to conceal priority of U.S. requirements for specific aircraft. He realized this might result in our paying for a low-performance aircraft, rather than the desired MIG-21, but felt the publicity would warrant overpayment. Subsequent offers could then be modified to stipulate MIG-21's. CINCPAC recommended offering \$100,000, plus a \$50,000 bonus, for the first aircraft and \$25,000 for the second. The suggestion was based on a study of the DIA Registry of Foreign Material Requirement List. He also recommended offering a reward of \$25,000 to pilots who defected by parachuting at sea and who were rescued by our forces.

He cited two possible disadvantages to such a program:

1. Overt bribery might give the U.S. a poor image since we were operating on the principle that our fighting in Vietnam was solely to repel aggression.

2. If North Vietnamese pilots succumbed to our offer, Hanoi might take out its resentment on FWMAF or GVN pilots they were holding.

CINCPAC believed the advantages outweighed the disadvantages, although the results would likely be limited and temporary. He recommended that Operation FAST BUCK be initiated as soon as possible. ^{47/}

Public Opinion and Civilian Casualties

In the public mind, the "flap" over the alleged bombing of civilians in the Hanoi area overshadowed all other air activities during December. Actually, authorization to strike Yen Vien (JCS Target 19) and the Van Dien Vehicle Depot (63.11) had been given in November. At that time, PACAF expressed concern that the strike on Target 63.11 would result in excessive civilian casualties and stressed that extraordinary precautions should be taken to insure accuracy. The 7AF was directed to use only experienced, carefully pre-briefed pilots and to attack only in weather permitting positive visual acquisition of target and delivery of ordnance. ^{48/}

Seven attempts to strike the target in November were cancelled because of adverse weather. It was finally struck by 20 sorties on 4 December. Pilots dropped 96/750-lb. bombs and reported that ordnance impacted throughout the target area causing secondary explosions resulting in a 30-foot fireball and a tall column of black smoke. The target was struck again on 13 December, with 91/750-lb. bombs, and on 14 December with 92/750-lb. and 12/1,000-lb.

bombs. Pilots reported that the rail yard was "ripped apart" and at least four buildings, plus rolling stock, were damaged or destroyed. Photography revealed that the Hanoi Railroad Car Repair Shop (JCS 20) had also been struck, probably on the same dates as JCS 19. 49/

Navy planes struck the Van Dien Vehicle Depot (63.11), on 2 December, in conjunction with the strikes against the Can Thon Petroleum Products Storage Area. Initial reports indicated that nine of the approximately 175 buildings in the complex were destroyed but much of the area was obscured by smoke. The three CVA attack against the Van Dien Vehicle Depot was coordinated with the 7AF attack against JCS 19 on 14 December. Moderate damage was reported to the target complex. 50/

A re-debriefing of the seven flight crews involved in the 13 December and 14 December strikes on JCS Target 19 confirmed that five flights had placed ordnance on target. However, one flight stated they were unable to acquire the target due to clouds and MIG attack. They were uncertain of exact release coordinates, but judged they were in the immediate target vicinity. They conceded that bomb trail distance might have caused ordnance to impact slightly southwest of the bridge located immediately south of the target. Another flight crew stated that, due to poor weather, they had difficulty seeing the marshalling yards. They believed ordnance hit rolling stock on tracks but the impact of some bombs was not observed because of jinking after release. 51/

On 16 December, JCS Target 19 was suspended until further notice.

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CINCPAC advised subordinate commands, on 23 December, that no air operations involving attacks against targets within ten NM of the center of Hanoi would be conducted until further notice. The center of Hanoi was defined as 21-19-37N 105-51-21E. Although the restriction applied only to operations involving the expenditure of ordnance, the transit of the ten-mile Hanoi area by strike aircraft was to be avoided. Reconnaissance operations within the ten-mile area were not restricted. This information was disseminated on a "need-to-know" basis and was not releasable to news media. ^{52/}

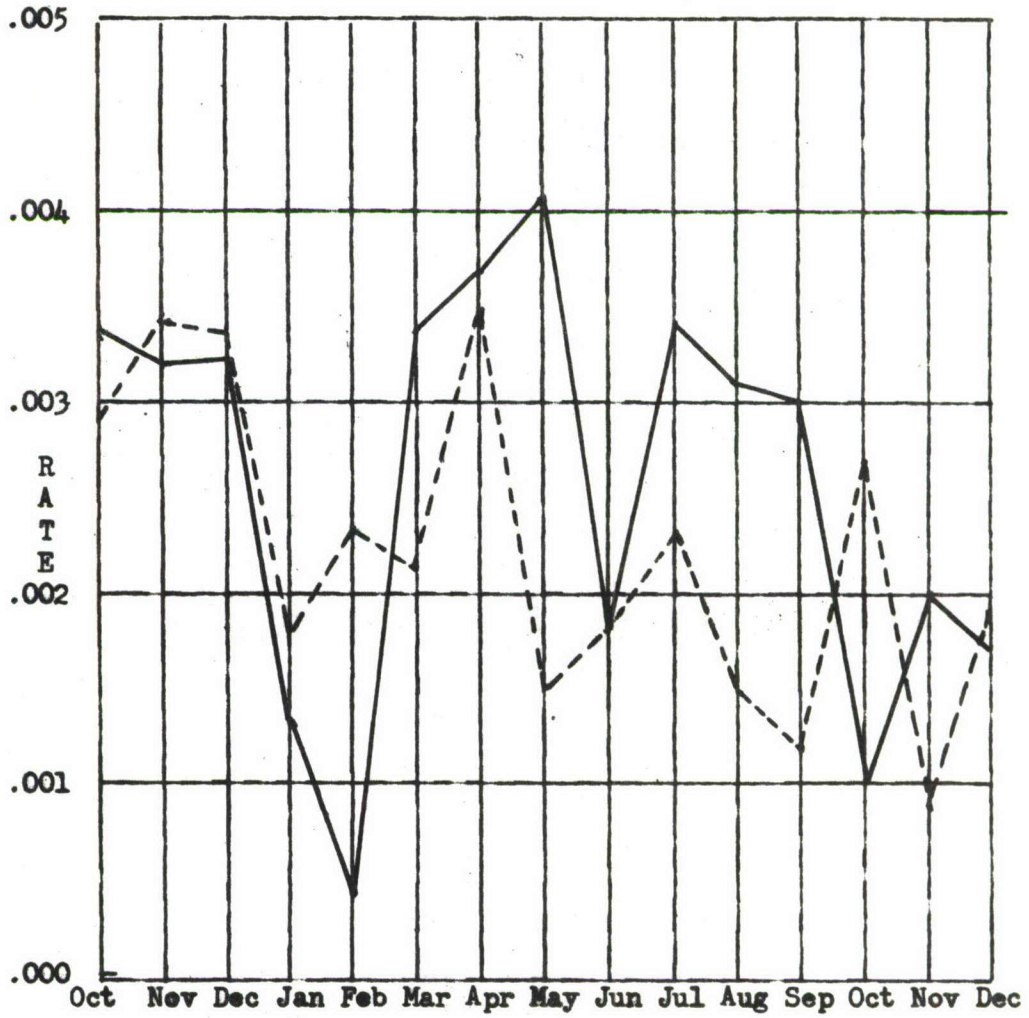
The 13-14 December raids caused an international furor. The Communist press claimed the U.S. had "bombed residential areas within the Hanoi city limits" and North Vietnam said that more than 100 civilians were killed. A series of articles by a New York Times correspondent, giving an eyewitness account of the alleged Hanoi damage, added to the public reaction. ^{53/}

A State Department spokesman stated, on 23 December, that it was American policy to strike only those targets contributing to Hanoi's effort to send men and materiel into South Vietnam. He stated that: ^{54/}

"...No information has been obtained ... to support allegations that US aircraft struck targets in Hanoi proper. We know a great deal of damage was caused by Hanoi's own surface-to-air missiles and anti-aircraft fire. If, in fact, any of our ordnance has caused injury or damage we regret it. Accidents do accompany conflict. They are a by-product of fighting Hanoi started and insists on continuing despite our efforts to achieve peaceful settlement."

With respect to the bombing of Nam Dinh, 60 miles south of Hanoi, a Defense Department official stated, on December 29th, that military targets

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COMPARISON OF MONTHLY COMBAT LOSS RATES IN NORTH VIETNAM

— Air Force
- - - Navy

Fig. 19

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	Mar 65-Dec 66				1-31 Dec 66			
	USAF		USN		USAF		USN	
	Dest	Dmgd	Dest	Dmgd	Dest	Dmgd	Dest	Dmgd
VEHICLES	1300	1307	1354	1455	28	245	43	30
LOCOMOTIVES	8	16	6	8	0	9	0	0
ROLLING STOCK	358	421	983	1359	20	6	18	14
RIVER CRAFT	808	1164	3122	5233	61	46	90	328
BOATS	201	160	289	378	0	0	0	0
FERRIES	79	113	22	44	0	0	0	0
AIRCRAFT	17	4	7	1	0	0	0	0
BUILDINGS	3756	3589	3345	2959	47	244	50	54
BRIDGES	823	1348	631	1651	58	176	36	54
ROAD CUTS		4789		3325		495		166
RAIL CUTS		392		495		19		33
FERRY SLIPS	34	134	14	49	0	61	0	0
RUNWAYS		17		4		0		0
AA SITES	559	245	266	140	31	38	17	6
SAM SITES	40	18	30	17	0	15	13	5
RADAR SITES	18	79	14	52	0	41	0	0

ROLLING THUNDER

Comparative Summary by Target Category

(USAF-----USN)

Fig. 20

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in the town had been struck 64 times by U.S. aircraft since mid-1965. The military targets attacked in Nam Dinh were the railroad yards, a warehouse and dock area on the river used as a transshipment center, petroleum storage depots and a terminal power plant. The Defense Department declined to say whether the evidence confirmed or denied reports carried by the New York Times that 89 civilians had been killed in Nam Dinh. 55/

CINCPAC had previously pointed out to JCS the inevitability of collateral damage in view of the enemy's improving defenses and his practice of locating lucrative military type targets in civilian areas. In September, he had told JCS that BDA photography revealed inadvertent collateral damage during the execution of attacks on POL and large open military supply storage areas located in and near Duc Tho. He said it was extremely difficult to avoid collateral damage in this heavily defended area since pilots were forced to jink, reducing the time to execute precise bombing runs to a minimum. During strikes against Dong Giap POL and Badon military supplies, 40 to 50 civilian houses were inadvertently destroyed at Badon and a cemetery adjacent to Dong Giap was also hit. CINCPAC had pointed out, at the time, that pilots were adequately briefed as to the necessity for avoiding collateral damage but that this was sometimes difficult under the pressure of combat. 56/

The 48-hour truces over Christmas and the Solar New Year gave the enemy an opportunity to resupply and reassign their troop positions. During the New Year's standdown, CINCPAC directed that the reconnaissance effort be concentrated on the location of logistic movement, particularly terminal



areas. He wanted maximum use to be made of reconnaissance intelligence by air, ground and sea action. Also, he wanted forces to be ready for action, immediately after the cessation of the standdown, to strike 57/ vehicles and key area targets.



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CHAPTER IV - NORTH VIETNAM GROUND/AIR DEFENSES

During 1966, ROLLING THUNDER air operations were conducted in an increasingly sophisticated defense environment. U.S. aircraft faced an effectively integrated system of radar-controlled antiaircraft weapons, surface-to-air missiles (SAMS) and air intercept. This presented a growing threat to the use of our tactical airpower, particularly in areas well-known by the enemy to be sanctuaries. ^{1/}

SAM'S

The U.S. lost its first aircraft to a guided missile on July 26, 1965, when a USAF F-4C was destroyed near Hanoi. By the end of 1965, North Vietnam was estimated to have 15 SAM firing battalions. During the bombing pause of December 24, 1965 - January 31, 1966, three additional battalions were added and many new sites constructed. At that time, one battalion consisted of the standard Soviet configuration with six launchers and all associated equipment for a firing unit. With the entire Red River Delta well defended by the SA-2 system, Hanoi deployed firing battalions southward from Thanh Hoa. In order to accomplish this and maintain SA-2 defense in the delta, some of the battalions were organized with three to four launchers rather than the standard six launcher battalion. The limited firepower of these "short" battalions was offset by tactical advantages of increased mobility and easy concealment. ^{2/}

The SAM system began to expand to the south, below Thanh Hoa, in mid-February and by mid-May had reached as far as Mu Gia Pass, the Ron

area and possibly as far south as Dong Hoi. Each of the progressively southern moves had been preceded or accompanied by the introduction of low-level acquisition radar capability (FLAT FACE) into the new area, with SAM primary acquisition radar (SPOON REST) noted in ELINT shortly after. With few exceptions each new firing location remained dormant of FAN SONG ELINT intercepts until a launch was made. By June, 106 SAM sites had been photographed and an additional 29 sites located on the basis of ELINT data.^{3/}

A trend toward SAM firings at night or afternoon to allow the site to move during the cover of darkness, or to camouflage to avoid a retaliatory strike, was noted by mid-year. Another apparent trend was toward tail shots from the rear quarter to minimize the possibility of the aircrew observing the missile in flight. Although a tail-quarter shot was theoretically not as accurate as a beam-short or head-on collision course, the possibility of surprise negating the use of evasive action by the flight could have been a predominant factor.^{4/} CINCPAC noted that U.S. successes in avoiding SAM's was due almost entirely to the rapid evasive action taken by the highly maneuverable tactical aircraft after ELINT warning or the visual observation of the SAM. He stated that the B-52's, of course, were not capable of making such a violent maneuver and for this reason he considered them very vulnerable to SA-2 shoot-down. He said that, in consideration of the limited return that could be expected from this attack and the risks involved, he believed that the use of B-52's should not be authorized, and added that JCS also disapproved.^{5/}

However, B-52's were used briefly in an effort to seal off Mu Gia Pass,

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^{B-52} but the raids were terminated after Hanoi ringed the Pass with SAM units. ^{MU 91A}
Although B-52's could operate high above weather that washed out tactical missions, they were considerably slower and made more inviting targets for missiles than the supersonic tactical fighter-bombers. Also, it was feared that Hanoi might be willing to make a special effort to bring down a B-52 because the feat would obviously boost morale in North Vietnam. 6/

After the U.S. attacked the Hanoi/Haiphong POL Complex, beginning on 29 June, ⁶⁶ most of the North Vietnamese SAM battalions south of Thanh Hoa were redeployed north into the Hanoi complex. The battalion structure in Hanoi thus became very compressed, with firing units located five to seven miles apart. Barrier defense, using temporary field sites, were set up along the northwest railroad in an effort to prevent or deter penetration of the Hanoi complex. 7/

CINCPAC pointed out that aircraft losses were increasing and that strike tactics and results were being adversely affected in areas of heavy SA-2 and AA concentrations. If the enemy should be able to extend these areas, the overall loss rate could be expected to increase. CINCPAC, therefore, believed that this would be an appropriate time to review all aspects of the SA-2 threat. The review should attempt to determine what could be done to counter the threat with present equipment and what additional equipment was required, particularly if the threat became more sophisticated or increased in scope. The CINCPAC recognized that improved equipment and tactics had already done much to counter the threat but, nevertheless, had not been able to overcome the missile's main accomplishment, i.e.,

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forcing aircraft to operate at lethal ground fire altitudes and degrading strike tactics to a serious degree. He stated that once SA-2 sites were located, they were destroyed. However, he noted that perhaps our greatest weakness was our inability to pinpoint active site locations on a continuing basis. Apparently even photo-interpretation did not have the capability to provide timely location information suitable to direct strikes. He felt this was one of several areas requiring careful consideration. Therefore, a conference was scheduled to be held at CINCPAC to analyze all aspects of the SA-2 threat and countermeasures to neutralize it. ^{8/}

To CINCPAC's request for comments, CINCPACAF replied that his plan of action involved the following countermeasures: Nullification of the threat by acquisition and destruction; by circumvention or evasion tactics; and by passive means, primarily electronics, such as RHAW and ECM. CINCPACAF pointed out that our concept of slow, steadily increasing pressure had permitted the enemy to build his defense without effective interference. He was able to camouflage and disperse components to an extremely effective degree. Consequently, our efforts to nullify the SA-2's by destruction had been frustrated and only partially successful. IRON HAND flights, designed to seek out and destroy SA-2 sites, had considerable difficulty in finding them or found them located in populated areas and political sanctuaries. The addition of WILD WEASEL and the AGM-45 (Shrike) had aided in target acquisition, but enemy tactics had countered by controlled emissions and the use of multiple firings. CINCPACAF stated that it was obvious we had remained one step behind the enemy and that effective target

UNCLASSIFIED



SAM



RF-4C

SAM Launch Against an RF-4C
Fig. 21

UNCLASSIFIED

acquisition and destruction required a marked improvement in equipment. The primary need was for an improved Shrike that could find a target using a short emission and then lead the flight to it. Also needed were ample quantities of area weapons, such as CBU-24's or other effective weapons, to complete the destruction. However, this method of nullifying the threat could never be completely successful if villages or restricted areas were allowed to provide a sanctuary for sites or control centers. ^{9/}

With respect to nullification of the threat by tactics, this had proven to be a fairly effective interim measure. However, it required trial and error methods and frequent changes to counter new enemy tactics. Carefully chosen altitudes, attack corridors, delivery techniques, and evasive maneuvers had allowed aircraft to continue to the target. The RHAW (radar homing and warning) was the greatest improvement in this area and full RHAW equipping of the force was an urgent requirement. Also, fusion and immediate transmittal of real time intelligence and warning was an urgent, near-future need. Tactics would remain a necessary and important area of defense, but every effort must be made to free USAF forces from interference with the primary job of getting to the target. ^{10/}

Until very recently, the nullification of the threat by passive means had been only partially successful. The ECM B-66's had certainly degraded the enemy defenses and assisted our forces, but they had not achieved the full degradation desired. However, the recent introduction of the QRC 160-1 ECM Pod was apparently highly effective. If this effectiveness continued and the air fleet was completely equipped, nullification of the SA-2 threat

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(also radar-controlled AAA) would have been achieved. 11/

Since the enemy's most probable reaction would be continued and increased MIG defense, CINCPACAF suggested urgent use of ECM jamming of VHF communications as a method of negating the enemy's GCI control. As a complimentary action, it was recommended that complete IRON HAND/WILD WEASEL efforts be continued with the objective of destroying the SA-2 threat before effective countermeasures could be undertaken by the enemy. This would require the improved Shrike previously mentioned. It would also be necessary to continue development of tactics and RHAW to counter the next step-up in the enemy SA-2 threat. CINCPACAF recommended that a program be established to destroy SA-2 support facilities, control centers (GCI) and EW sites. This would require a Shrike that could find and mark EW radar plus ample 12/ CBU-24's to complete destruction.

As a result of the CINCPAC S-2 Threat Conference (24-26 October), CINCPACAF advised 7AF to immediately implement the recommendation that when an occupied SA-2 site was located by IRON HAND or any other means, sufficient numbers of available strike aircraft in the area should be diverted to this target to insure complete destruction before the enemy had the opportunity to move undamaged components from the area. The recommendation was based on the demonstrated fact that an adequate quantity of munitions were available in a single IH flight to effect complete destruction. Also, North Vietnam had demonstrated outstanding ability to rapidly move components, after our detection, with the result that only partial destruction of installation was achieved. In a few days the

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installation was again operating against our forces from the new location. ^{13/}

CINCPACAF emphasized that all tactical commanders should be aware that a primary objective in our operations in North Vietnam was the destruction and harassment of the SA-2 system. CINCPACAF recognized that it was the prerogative of the 7th AF Commander to divert strike aircraft from the primary target to opportune SA-2 sites, based on the target and the tactical situation. The authority to divert aircraft within these parameters was contained in the ROLLING THUNDER 51 Basic Operations Order of 1 April. ^{14/}

CINCPAC advised subordinate commands on 19 November of other recommendations proposed by the CINCPAC SA-2 threat conference. At this time they were not to launch an all-out campaign against the SAM sites but to continue the present policy of diverting all available strike forces to attack an occupied SA-2 site as soon as it was detected. High priority targets were to be attacked, by type, in random fashion in order to avoid predictable strike patterns. Preferably the strikes should be large attacks, with strike timing closely coordinated by PACAF/PACFLT. In the SA-2 environment, aircraft equipped with ECM and missile warning equipment might be able to use the altitude region between 10- 20,000 feet, consistent with the tactical situation. High-G maneuvers would continue to be required if engaged by the SA-2 system. Although there was no evidence, to date, of the enemy exploiting electro-magnetic radiation from U.S. aircraft, this possibility had to be guarded against with regard to IFF, TACAN, airborne radars, ^{15/} etc.

In reply to a query from the Air Force Command Post (AFCP), as to the

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number of aircraft which had jettisoned ordnance because of the SAM threat, PACAF Command Center (PACAFCC) replied that the number was insignificant. In the few cases involved, the jettisons had taken place not as a result of the SAM threat but, rather, low fuel conditions resulting from evasive tactics or inability to acquire the target. The SAM threat had had no effect on sortie scheduling in RP I. However, there would have been more sorties scheduled in RP V and IV if there had been no SAM threat. The ordnance jettison procedures followed the instructions in 7AF Operations Order 1-67 dated 31 August 1966. ^{16/}

By November, there were 30 possible, operational firing units in NVN. The majority of the active battalions remained deployed in the Red River Delta area, with the point defense system still existing around Hanoi, Haiphong, Hai Doung, Nam Dinh, Thai Nguyen and Kep. There was also a possible site in Route Package I, three to five battalions south of the Red River Delta, one to two battalions near Thanh Hoa, and two or three in the Vinh area. ^{17/}

In December, most of the NVN battalions were in a SAM triangle from Hanoi to Haiphong to Nam Dinh. Eight to nine battalions were deployed within a 12-14 mile radius of Hanoi, with another two battalions operating north of Hanoi to Thai Nguyen, with a battalion occasionally moving from Hanoi into this area. One battalion appeared to remain in an area 35 to 45 miles southwest of Hanoi, providing some defense of this approach to the city. Five battalions provided relatively stable defense of Haiphong and were usually deployed five to ten miles apart near the city. One battalion

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normally deployed toward Hai Duong where one to two more active sites provided continuity in the coverage between Hanoi and Haiphong. One of the Hai Duong battalions frequently deployed toward Kep Airfield where at least one active site provided point defense. Completing the triangle, Nam Dinh appeared to be the base of five to six battalions which defended the southern Red River Delta area and the southeastern approaches to Hanoi. One of these battalions deployed south to the Thanh Hoa area for extended periods, while one frequently moved toward or into the Hai Duong area. 18/

Below Thanh Hoa, at least two and possibly three battalions operated between Vinh and a point 35 miles north of the city. During December these battalions had deployed so as to provide mutual protection to their sites. Despite the destruction of SA-2 equipment in September and October, continued ELINT intercepts of FAN SONG tracking and guidance signals in December indicated at least one SA-2 battalion was still in the northern part of RP I or the southern part of RP II. The most likely locations were around Dong Hoi or along Route 1A just north of Cape Mui Ron. 19/

SAM firings against U.S. aircraft increased substantially in December to a total of 212; the previous high had been in August when 186 SAM firings had taken place. The greatest number of firings (72) on a single day occurred on 2 December. On that day, five USAF and three Navy aircraft were downed; five of the losses were attributed to SA-2 missiles. This represented approximately one-seventh of the total number of losses to SA-2 missiles to that date. 20/

During the year, SAMS accounted for 5.4 percent of U.S. aircraft losses.

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Although this percentage was a relatively small portion of aircraft losses, the SA-2 system forced attacking aircraft to utilize lower altitudes where antiaircraft artillery (AAA) and automatic weapon (AW) fire was more effective. SAM firings, by month, are shown below: 21/

Jan	5	Jul	144
Feb	12	Aug	186
Mar	28	Sep	92
Apr	29	Oct	31
May	35	Nov	104
June	30	Dec	212
(1966) TOTAL:			908

During the year, the press frequently quoted official sources on the poor performance record achieved by the Russian SAM's against U.S. planes. North Vietnam's unsatisfactory score with missiles was attributed to their comparatively poor quality (the SA-2's were not the latest or best in the Soviet arsenal), the ineffective training of the crews, and the various evasive tactics and electronic countermeasures worked out by the U.S. The SA-2 was comparable to the old American Nike-Ajax, now obsolete, phased out and replaced by the much improved Nike-Hercules. The Russians had developed improved missiles but had not yet supplied them to Hanoi. 22/

Humidity and other climatic factors were, to some extent, responsible for the inaccuracy of Russian missiles, according to the Soviet Military Attache. He stated, early in 1966, that more missiles would be sent to

North Vietnam but he did not believe that any large commitment of Soviet personnel would be necessary since Hanoi had more than enough men to escalate the war to any degree required. ^{23/}

The publicity concerning the SA-2's poor performance record was a matter of concern to the JCS. They pointed out to CINCPAC that Soviet officers, in conversations with Western military personnel, had stressed the Soviet intention to supply North Vietnam with more and improved equipment. In particular, the Soviets mentioned providing Hanoi with more modern SAM's of increased effectiveness. The JCS believed we had been indiscreet in making public the numbers of SA-2 missiles launched versus aircraft downed by NVN and our cleverness in devising effective countermeasures. They believed this would result in greater hazards to our aircrews and increase our aircraft losses to SAM's. It was also believed it might goad the Soviets into providing Hanoi with more advanced equipment. They suggested a review of policies on press releases with a view to eliminating any information beneficial to the enemy defense effort. They further recommended adoption of a policy of caution in discussing military operations or techniques with other than those persons who had positive need-to-know. ^{24/}

Air Intercept

Communist China provided North Vietnam with its initial 36-44 MIG-15/17's in the period from August 1964 until the summer of 1965 when Soviet aircraft shipments began. Approximately 65 MIG's were received by Hanoi in addition to eight IL-28 light jet bombers. In December 1965, 11 MIG-21's

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were seen at Phuc Yen. In March 1966 photography, 15 Fishbed's were counted along with 53 aircraft crates, 25 of which were large enough to contain additional MIG-21's. The USSR reportedly promised North Vietnam 60 Fishbed fighters during 1966. ^{25/}

During the first quarter of the year the North Vietnamese Air Force continued previously established air tactics of committing fighters to combat when the tactical advantage was with the MIG's. There was an increase in the frequency of MIG activity against U.S. aircraft, especially against unarmed reconnaissance types. Most of the MIG activity over the Gulf of Tonkin was also noted. MIG-21's were active against high altitude reconnaissance aircraft over northwestern North Vietnam. Other activity involved MIG use of surprise tactics against strike aircraft or making long-range, non-firing passes before breaking off and returning to the protection of the SAM envelope. ^{26/}

As a result of the continuing increase in the MIG inventory and an anticipated expansion of the GCI system, U.S. air operations were expected to face a more formidable threat in the future. However, the vulnerability of the limited number of jet airfields implied some restriction on the employment of enemy air forces. The extensive airfield improvement and construction program, begun last year, continued to make good progress. Activity had been noted at eight airfields and possibly one or two other major fields may also have been under construction. In the past, NVN's fighter aircraft had been staged out of two bases, Phuc Yen and Kep, but it appeared likely that some fighters might be dispersed to other fields in

[REDACTED]

the near future. 27/

An analysis made by 7AF, early in the year, of the enemy air defense system revealed an increasingly sophisticated system employing early warning, gun-laying radar, SA-2 missile battalions, and MIG air-intercept. In nearly every case where U.S. aircraft had been forced to descend to lower altitudes because of the SA-2 threat, the planes had met intense AW/AAA fire. Likewise, night engagements by AAA/AW had increased. This included the use of weapons without gun-laying radar, which 7AF believed indicated a possible link-up between GCI/EW installations and AAA/AW units. As far as air defenses were concerned, 7AF felt we were in the same position in March 1966 as we had been at the time of the initial development of SA-2 defenses in North Vietnam. This was because the enemy had increased the activity of later model MIG aircraft and, also, additional enemy airfields were becoming operational to accommodate these later model aircraft. The Commander, 7AF, felt the U.S. should not stand by to see the development of a fully integrated and operational air-missile and AAA/AW defense system in NVN, since it would pose an unacceptable threat to the strike forces. He, therefore, recommended that he be granted immediate authority to strike all airfields in North Vietnam capable of supporting jet operations and that he be allowed to restrike to keep the fields non-operational. He wanted the EW/GCI complex at Kep to be considered a high priority target and neutralized immediately. He recommended that IRON HAND forces be authorized to destroy all of the SA-2 sites that posed a threat to, or fired upon U.S. aircraft striking the above targets. He believed that it was better not to have a

time limit for strikes against JCS targets and recommended that a target be struck until the desired damage level was attained. This procedure would allow more flexibility in the utilization of the strike force and also preclude the one-shot attack, which required a large strike force. A greater degree of suppression and reduced vulnerability could be attained by the use of a smaller force. 28/

In April, CINCPAC directed CINCPACFLT and CINCPACAF to provide him with their plans to counter the MIG threat. He gave them two options: Option 1 would be coordinated daylight strike in which CINCPACFLT would be assigned the Kep Airfield and CINCPACAF the Phuc Yen Airfield. They would both provide the required strike and support aircraft, the route planning, and tactics. Option 2 would be under the assumption that SAC B-52 strikes would be made against Kep and Phuc Yen during hours of darkness. Under this option, both CINCPACFLT and CINCPACAF would provide follow-on strikes during the first daylight hours. The objective of these follow-on strikes would be to destroy MIG's which might have escaped destruction at Kep and Phuc Yen or which might have dispersed to other fields. CINCPACAF was assigned the following airfields: Hanoi/Bac Mai, Hanoi/Gia Lam and Phuc Yen. Kep, Haiphong/Cat Bi and Haiphong/Kien were assigned to CINCPACFLT. Under this option, CINCPACFLT and CINCPACAF would jointly provide the required strike and support aircraft, tactics, and route planning. CINCSAC was to provide CINCPAC with his plan of attack on Phuc Yen and Kep airfields with B-52 resources and such support as required from PACOM forces. 29/

As a result of increased MIG activity, the requirements for strikes

[REDACTED]

against jet capable airfields were reviewed by CINCPAC in April. CINCPAC concluded that the MIG threat could be countered without striking their bases. He stated that his thinking was based on recent events. If the situation were to change, he would then recommend that all jet capable bases be struck simultaneously in order to gain maximum surprise and results. ^{30/}

Until April 1966, MIG aircraft did not pose a serious threat to U.S. forces and appeared content to train. The first clash between U.S. aircraft and the new high-performance MIG-21's took place on 23 April and raised the prospect of an intensified air war. From 23 April through 12 May the MIG force actively and aggressively engaged U.S. forces. Their tactics suggested that support aircraft were their prime targets. All engagements took place at altitudes of 10,000 feet and above. The support forces, primarily ELINT/ECM aircraft, were well protected by F-4C MIGCAP aircraft, however, and the MIG tactics resulted in USAF destroying five MIG-17's and one MIG-21. No aggressive enemy air action was encountered for about a month, with Hanoi apparently using this period to continue extensive GCI training when no U.S. aircraft were in the area. ^{31/}

Beginning 12 June, North Vietnam again began scrambling MIG interceptors in defense of the Red River Delta area. A change in tactics became apparent. Intercepts were attempted against strike forces, rather than support aircraft, and were conducted at low-level between 1,500 and 3,500 feet AGL. These aggressive tactics continued until 22 July when the MIG force again stood down. ^{32/}

When North Vietnam suffered losses in air-to-air combat, it customarily

suspended operations and intensified training for a short period. By mid-August, however, Hanoi apparently felt that its aircrews were ready to operate multiple flights against U.S. strike aircraft. The new aggressiveness of enemy forces may have signalled the completion of Soviet training of MIG-17 and MIG-21 pilots, which probably included complete all-weather GCI instruction. MIG aircraft were active almost every time strike forces penetrated to within 30nm of Hanoi. However, their tactics were no longer standard and MIG's might now be expected to approach either from low-level or from 15,000 to 20,000 feet, but invariably from the rear quarter. Intercepts against strike aircraft were more difficult than those against support forces because of the lower altitudes at which these strike forces penetrated. However, results outweighed the extra effort since strike aircraft were heavily laden and lacked maneuverability. Also, under attack the strike aircraft had to jettison ordnance to conduct effective evasive action and thus reduce the impact of the interdiction effort. ^{33/}

During the period 1 Jan - 17 October 66, the MIG threat resulted in 77 aircraft being forced to jettison. The marked increase in MIG aggressiveness during September required 56 aircraft to jettison ordnance in that period. The MIG's were still careful to avoid prolonged combat, but a single feint or firing pass caused U.S. aircraft to jettison ordnance, which neutralized the sortie. ^{34/}

MIG activity reached a record high during December. Air Force aircraft had 35 encounters and 16 engagements, involving 118 enemy aircraft. The previous highest level of MIG activity had been in September, when 71

enemy aircraft were reported. From April to December 1966, there were 108 encounters and 72 engagements between the MIG's and Air Force/Navy forces. Ninety-two percent of the encounters and 80 percent of the engagements involved Air Force aircraft only. A total of 20 enemy aircraft were shot down by all Services during these engagements; 15 of them by Air Force ^{35/} pilots.

In December, the JCS asked CINCPAC for his recommendations on the measures that could be taken to neutralize the MIG threat. JCS stated it had already submitted several recommendations to the Secretary of Defense for eliminating the threat through attacks on NVN airfields. However, all of these recommendations were disapproved on the basis that military advantages of the proposed strikes did not outweigh the military and political risks. However, the increasing boldness of the MIG's and their impact on U.S. air operations were matters of deep concern to the JCS. Therefore, they requested recommendations to be incorporated into a study which would give additional reasons why the MIG threat should be neutralized in the air or on the ground without delay. The JCS study would point out that the entry of North Korean pilots and the first successful employment of an air-to-air missile were evidence of the enemy's determination to improve his MIG capability. The MIG threat, in addition to AAA and SAMS, was an important factor contributing to inaccurate bombing. It forced U.S. aircraft to jettison ordnance in order to defend themselves, thus forcing the mission to abort and contribute to damage of non-military targets and non-combatants. MIG airfields were well-defined military targets, and the fields

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and the command and control targets located on them were the most lucrative and vulnerable elements of the enemy air defense system. Neutralization of the MIG's would greatly reduce MIGCAP and improve the effectiveness of ^{36/} the total air effort and probably contribute to lowering enemy morale.

The increasing enemy air challenge to U.S. operations also renewed public discussion of the bombing limitations against airfields and harbors. It was well known that military authorities had asked permission to destroy the MIG fighter bases but had been overruled. The reasoning behind the civilian decision not to permit bombing of the airfields at this time was reported as follows: ^{37/}

1. The U.S. aircraft loss rate to MIG's was not serious but heavy losses might be sustained in an attack on the well-protected airfields.
2. Communist China or the Soviet Union might replace the MIG's destroyed, perhaps even with more and better planes.
3. Communist China might offer Hanoi bases inside its borders and thus create a serious dilemma for the U.S.

Antiaircraft Artillery

The number of automatic antiaircraft artillery weapons also increased substantially during 1966. As of January 1966, North Vietnam was estimated to have 5,000 weapons; this estimate had risen to 7,400 by the end of the year. The inventory included the .50-cal. machine gun of U.S. design, which had been modified by the Chinese and North Vietnamese for antiaircraft use. Hanoi had also taken measures to increase weapon accuracy through tracking radar and saturation deployment and to employ heavier weapons where

increased kill probability was most desired.

During the latter part of 1966, pilots operating in RP V and VI-A reported far more instances of 100mm AAA than in previous months. The buildup in defenses included RP II, III and IV, but no apparent AW/AAA trends or developments were noted in these areas. RP I reflected a greater weapons increase than any of the other route packages. The majority of the newly-delivered guns were placed along the major LOC's, and in the three major coastal city areas of Ron, Quang Khe and Dong Hoi. Barrage fire in RP I increased steadily during the last six months of 1966.

The following figures attest to the effectiveness of AW/AAA against high performance type aircraft. From January 1965 to 31 December 1966, 384 U.S. aircraft were known to have been shot down by ground fire in NVN. For every aircraft shot down, approximately three suffered battle damage due to ground fire. Of all the aircraft lost to ground fire, 53.5 percent sustained their initial hit below 4,500 feet; 6.3 percent were hit between 4,500 and 5,000 feet; and 12.8 percent above 5,000 feet. The remaining 27.4 percent were lost at unknown altitudes. The overall percentages were as follows: 55 percent were hit by light AAA, 17 percent by AW, 4 percent by medium AAA and an additional 4 percent by unknown type ground fire. ^{39/}

NVN Radar

The radar defense net continued to show improved coordination between its various entities through the year so that by the end of the year MIG activity, SAM launches, and AAA fire were noted as organized reactions

against U.S. air strikes.

The relatively sophisticated multifrequency GCI associated radars of the TOKEN family, which included the BARLOCK and BIG BAR B, increased from six sites in 1965 to eight in 1966. ROCK/STONE CAKE height finders were deployed as far south as Ma Tinh and could provide limited GCI coverage to the Dong Hoi area. Numerous intercepts of CROSS UP IFF transponder emissions and the detection of a probable SPIN SCAN B occurred during the latter half of 1966. Both systems were associated with the MIG-21/Fishbed and the presence of the SPIN SCAN could add an all-weather and beam-rider missile-carrying capability to the NVN fighter force. In addition to IFF responses, the CROSS UP also may have possibly provided landing and air navigation aid. FLAT FACE and CROSS SLOT radars were deployed throughout NVN providing low-level and gap filler functions. There were indications they may have acted as acquisition for AAA batteries by furnishing azimuth and range. Primary deployment of the CROSS SLOT was along the coastal ^{40/} regions.

Emitter control (EMCON) was used rather effectively with the FAN SONG radar during 1966. Transmission was kept to a minimum but provided enough information to intercept a target and guide the missile. This shortened the warning time to aircraft and limited the ability of ELINT collectors to DF the source of emission. The primary GCI sites in NVN appeared to be at Bac Mai Airfield, another near Ha Dong, and two more near Phuc Yen Airfield. These sites, equipped with BARLOCK/BIG BAR B surveillance radars and either ROCK/STONE CAKE or SIDE NET height finders, were almost always

noted operating when NVN fighters were airborne and usually secured transmission immediately when fighter activity ended. ^{41/}

With Soviet and Chinese Communist technical and material aid, North Vietnam, by 1966, had established a complex defense system which many military authorities described as the most formidable one ever faced by U.S. aircraft. The enemy's defensive environment was immeasurably aided by sanctuaries provided by U.S. political restraints on bombing. These facts belied the claims made by some critics that U.S. air operations in North Vietnam were directed against a helpless and unsophisticated opponent. ^{42/}

CHAPTER IV - REVIEW AND ANALYSIS

Statistical Analysis

How successful were ROLLING THUNDER operations? Did the gains offset the loss in U.S. personnel and aircraft and the political repercussions, both at home and abroad? As the second year of operations drew to an end, both official and unofficial sources redoubled their efforts to answer these questions. One method was through statistical analysis of the results achieved by bombing of targets in the North. However, not all of the achievements of ROLLING THUNDER could be quantified. It would be impossible to statistically portray the effects of the bombing on North Vietnamese morale or its impact upon communist strategic policies. Similarly, the number of bridges or buildings destroyed did not reflect the diversion of manpower which was necessary to offset these losses. ^{1/}

During 1966, the Air Force alone engaged in 44,500 attack sorties and expended 70,108.6 tons of ordnance over North Vietnam. The results were 2,617 buildings, 1,356 bridges and ferry slips and 826 AAA, SAM and radar sites destroyed and damaged. In the transportation sector, 2,320 vehicles, 541 railroad rolling stock, 2,025 water craft and 29 aircraft were destroyed and damaged by the bombing which also resulted in 4,159 highway and railroad cuts. However, in addition to the pilots captured and killed, the USAF lost 217 aircraft during out-of-country operations (the majority of them occurring in North Vietnam); the Navy lost 122. ^{2/}

Enemy personnel strength in South Vietnam increased by approximately

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40,000 during 1966 and, at the end of the year, an estimated 110,000 personnel were accepted in Viet Cong/North Vietnamese Army main force units. Most of the increase was due to the infiltration of North Vietnamese Army units into South Vietnam. Following is a monthly breakdown of infiltration figures: ^{3/}

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>
Confirmed	3,482	6,745	11,537	90	400	10,460
Probable	1,785	2,368	1,324	391	2,890	600
Possible	<u>2,070</u>	<u>2,410</u>	<u>3,900</u>	<u>20</u>	<u>3,465</u>	<u>1,315</u>
Total	7,337	11,523	16,761	501	6,755	12,375
	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Confirmed	4,238	1,550	1,400	115	---	---
Probable	120	400	---	500	---	---
Possible	<u>5,506</u>	<u>3,300</u>	<u>300</u>	<u>4,560</u>	<u>630</u>	<u>1,050</u>
Total	9,864	5,250	1,700	5,175	630	1,050
<u>CY 1966 Total</u>						
Confirmed	40,017					
Probable	10,378					
Possible	<u>28,526</u>					
Total	78,921					

At the end of the year, it was estimated that the communists had the capability of infiltrating 7,000 - 9,000 equipped men per month through routes in Laos, Cambodia, and the DMZ. These routes were also used to bring in equipment, arms ammunition, and other supplies to continue the war of attrition. As 1966 ended, the enemy's logistic system was supplying approximately 128,000 combat and combat support persons with these items from out-of-country resources while most of his food was procured within South Vietnam and Cambodia. ^{4/}

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Air Force Secretary's Review

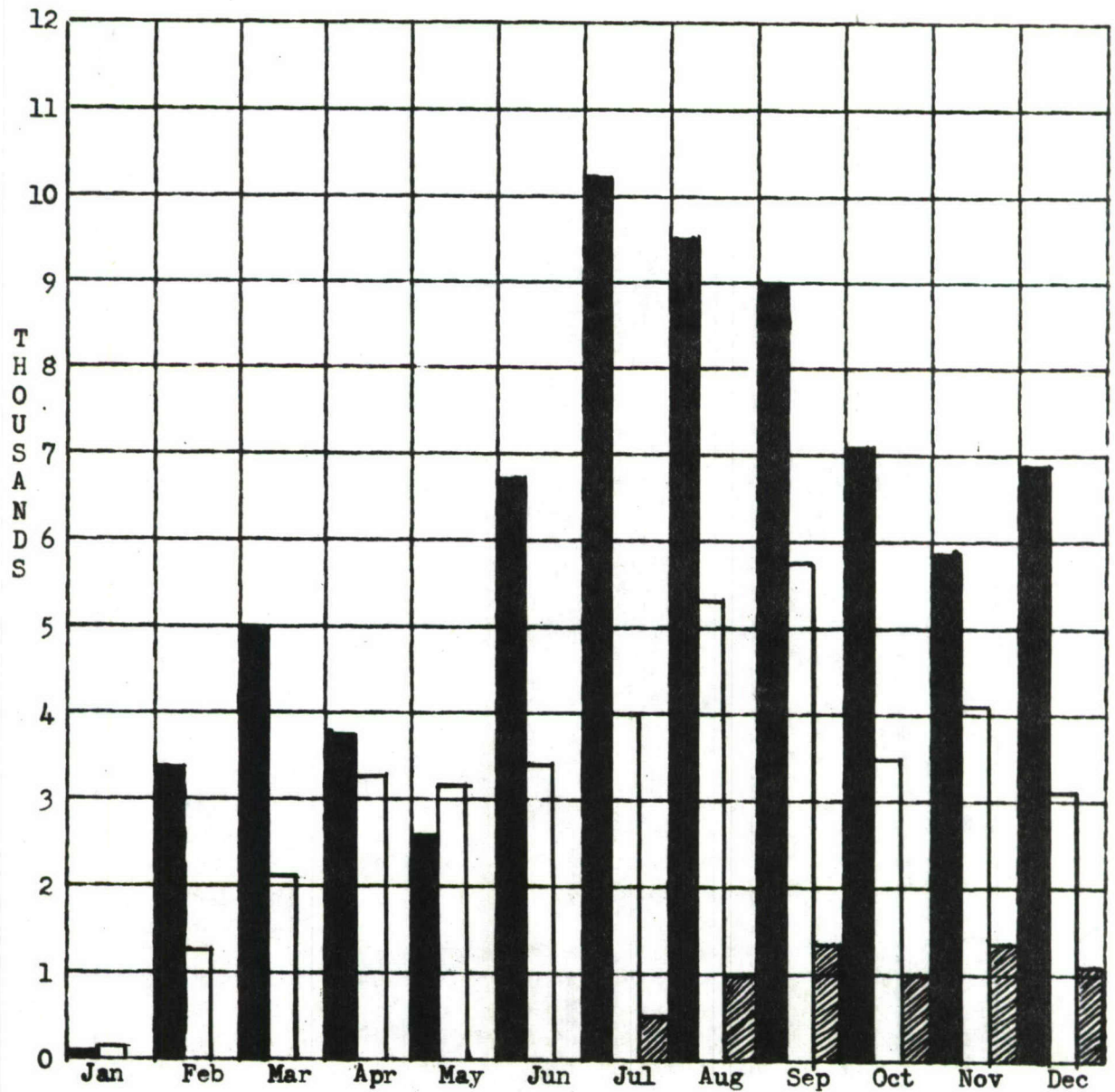
The Secretary of the Air Force summarized the role of air operations against North Vietnam in 1966 as follows: ^{5/}

"...An important effect of US tactical airpower has been its impact on the ability of North Vietnam to support combat operations in the South with troops and material. Infiltration appears to have leveled off during the last six months of the past year. Certainly, it could have reached a much higher level had it not been for air strikes against military targets in North Vietnam, including transportation facilities and en route convoys. And even more important, the interdiction campaign has denied the North Vietnamese and Viet Cong the equipment and supplies with which they might have retained the initiative.

"North Vietnam's infiltration of troops during 1966 was achieved at a very high cost. Most important, it failed in terms of combat results, the presumed goal of the long trek south. Battalion and larger size attacks have fallen from a high of seven per month during most of 1965 to a low of less than two per month in the last half of 1966. This decrease in enemy-initiated attacks has occurred in spite of an increase in enemy battalions, and has also been accompanied by increasing enemy battle deaths and losses due to capture and defection. At the same time US casualty rates have declined. An important reason for enemy failure in combat is the fact that it is a far more difficult job to support larger scale sustained combat operations than it is to infiltrate. It is on this basis -- as well as the cost of infiltrating troops, that the air interdiction campaign must be judged.

"Estimates vary widely as to the support requirements of infiltrators once they reach South Vietnam. Consumption varies greatly with the frequency and intensity of combat. But there can be little doubt of the great leverage which air interdiction has on the cost of aggression. To stop infiltration completely by air attack alone would be prohibitively expensive for us if it could be done at all. But to render the infiltrators far less effective in sustained combat, as

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
■ USAF	.01	3.4	5.0	3.8	2.6	6.7	10.2	9.5	9.0	7.1	5.9	6.9
□ USN	.11	1.2	2.1	3.2	3.1	3.3	4.0	5.3	5.8	3.5	4.1	3.1
▨ USMC	---	---	---	---	---	---	.5	1.0	1.3	1.0	1.4	1.1

DELIVERED ORDNANCE IN TONS - NORTH VIETNAM

Fig. 22

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well as to exact a heavy direct cost for North Vietnam's logistic support, is not only possible -- it is being done."

PACAF Comments

CINCPAC directed that a review and analysis be made of the results achieved by ROLLING THUNDER during 1966 in order to provide the basis for 1967 targeting concepts. In response to CINCPAC's request, CINCPACAF presented its major objectives for 1967 and an evaluation of the 1966 ROLLING THUNDER program. The salient points of the 1966 review follow. ^{6/}

Assessment of Accomplishments

An assessment of effects of air revealed that thousands of vehicles were destroyed, including trucks, rolling stock and watercraft. In addition thousands of tons of POL were destroyed as a result of concentrated effort against the POL facilities. Movement of vital war materials had been impeded by the destruction of hundreds of rail and highway bridges. CINCPACAF noted that, "without the disruption that was achieved by air-power, the communist forces might long since have been able to marshall major forces for all-out offensives towards SVN." ^{7/}

Enemy Reactions

JAN 67

CINCPACAF ^A noted that the enemy reactions to the ROLLING THUNDER efforts were immediate and resourceful. He pointed out that the enemy resorted to alternate means of transporting war materials, such as the use of pack animals and human portage. The enemy also increased his use of watercraft

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to counter the loss of the rolling stock and trucks and the interdicted LOC's. The North Vietnamese had demonstrated exceptional recuperative capability which they demonstrated by building by-passes and rebuilding destroyed bridges in minimum time. Additionally, he noted that the attacks against the enemy's POL facilities were offset by the increased imports of POL and the rapid dispersal of remaining POL stores. In response to our air attacks, the enemy had accomplished a major buildup of his air defense system which included a sophisticated EW/GCI network. Also, the enemy had increased significantly his SAM and AAA capabilities. ^{8/}

Limiting Factors

CINCPACAF noted that many factors had hampered the ROLLING THUNDER ability to counter the reactions of the enemy and to accomplish desired objectives. One limiting factor was poor weather for prolonged periods of time. This factor, together with the enemy's ability to repair and reconstruct damaged targets, limited the attempts to impede the flow of war materials. In addition, political restraints and geographical sanctuaries continued to circumscribe the efforts of airpower. ^{9/}

Lesson Learned

CINCPACAF pointed out that efforts in 1966 indicated that a gradual, drawn-out campaign created very little psychological impact on Hanoi's leaders and the populace. The great lie put out by the government of NVN about the victory in the south was extremely difficult to support in the face of destruction by airpower of even a few targets in the vicinity of

Hanoi and Haiphong. Hanoi's tirade against the bombing provided a true indication of the impact of air attacks on the Communist regime. CINCPAC noted that the 1967 task of bringing the war to the doorstep of the NVN government had to be continued and increased. He said there should be no circles around Hanoi and Haiphong denoting arbitrary areas of sanctuary. The target concept, instead, must be the simple one of attacking every significant military supply target. This should be done with continued careful avoidance of civilian populated areas. He felt that the exhaustion of men and material by the enemy could be accomplished through attrition of war material, pressure on Hanoi, and aggressive search and destroy operations in SVN.^{10/}

Greater Targeting Freedom

CINCPACAF noted that the need for greater targeting freedom was emphasized by experience, up to the end of 1966, in the conduct of the air war in SEA. He pointed out that the basis for this requirement was a two-fold problem:

- Enemy restoration of targets.
- Weather preventing timely re-attacks.

CINCPACAF felt that such a situation created the need for targets requiring long intervals for repair. He saw the following targets as being in the category of hard-to-repair targets:

- Port unloading machinery.
- Power plants.
- Aircraft maintenance and repair facilities.

[REDACTED]

CINCPACAF noted that these types of targets would create hardships and would weigh heavily on the enemy's hopes of achieving victory. ^{11/}

MSQ-77

CINCPACAF noted that the requirement for all-weather attack systems would be met, in large measure, through the use of the MSQ-77. He also felt that self-contained radar fire control systems would also assist in solving the all-weather problem. ^{12/}

Target Mix

CINCPACAF said it was important to strive for a practical target mix, considering Air Force capabilities, that would give maximum return for effort. He presented the following targeting concept: ^{13/}

1. The spectre of a long war should be treated as being intolerable. The targeting should be bold and broad enough to demonstrate national determination.
2. The targeting should be made to maximize attrition of the war-supporting material in the prime distribution centers. For this purpose large supply and storage facilities in the vicinity of the Hanoi and Haiphong area must be brought under attack. Supplies must be hit before they were dispersed in small units throughout the country. Force should be concentrated when striking this target system to compound effects. To produce the maximum attrition of war supporting materials, a continuing coordinated strike campaign on supply and storage facilities should be carried out by the Navy and Air Force.
3. Targets should be selected so as to continue the attrition of the war-supporting goods and facilities at dispersed locations along the LOC's south of Hanoi/ Haiphong. CINCPACAF noted that this attrition in depth

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should provide profitable opportunities to diminish further the war-making capability of the enemy. He noted that this effort would range from dispersed storage areas in southern NVN to the industrial installations in the north.

4. Occasional selective strikes at key bridges would be required to impede traffic. CINCPACAF pointed out that he did not anticipate extensive interdiction effort in this direction. However, selective strikes were required to impede traffic and to permit the attrition of vehicles and in order to restrict the redeployment of the labor force occupied in repair activities.

Lucrative Targets

CINCPACAF noted that target lists forwarded to CINCPAC on 5 January 1967 contained the most lucrative targets (power, storage/supply, industry, SAM support, military installation, airfields, POL, railroads, locks) in accord with our objectives. The greatest number of targets (74) fell in Route Package VI-A, followed by 26 targets in Route Package I. He noted that the targets in Route Package VI were the key to the enemy war-making potential but most of them were currently prohibited. He felt this was an opportune time to press for a high-value target base since Communist China was preoccupied with internal problems. External supplies transiting through ports should be limited to the maximum extent and followed by attacks on the electric power system. The striking of selected industrial targets would significantly reduce Hanoi's war-supporting capabilities and also tax the Communist Bloc to provide replacement. If authority were granted to conduct close-in attrition in the vicinity of major ports, the campaign would concentrate on the Haiphong area to destroy bulk supplies.

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A similar but lesser effort would be carried out in the Hanoi area. Constant pressure, day and night, would be required to make this program effective. An attrition program throughout the rest of North Vietnam should be continued to further reduce, as much as possible, any of the forces and supplies getting through the Hanoi/Haiphong area. ^{14/}

CINCPACAF stated that campaigns should be carefully designed to create the greatest possible psychological impact on the government and people of NVN. Attacks must be coordinated to achieve destruction of the target system in the shortest possible time, thus bringing home to Hanoi the full impact of our strength and determination. To accomplish a task of this magnitude, the broadest possible target base and sufficient flexibility, ^{15/} timewise, to plan for best possible weather periods were needed.

Targeting Concepts for 1967:

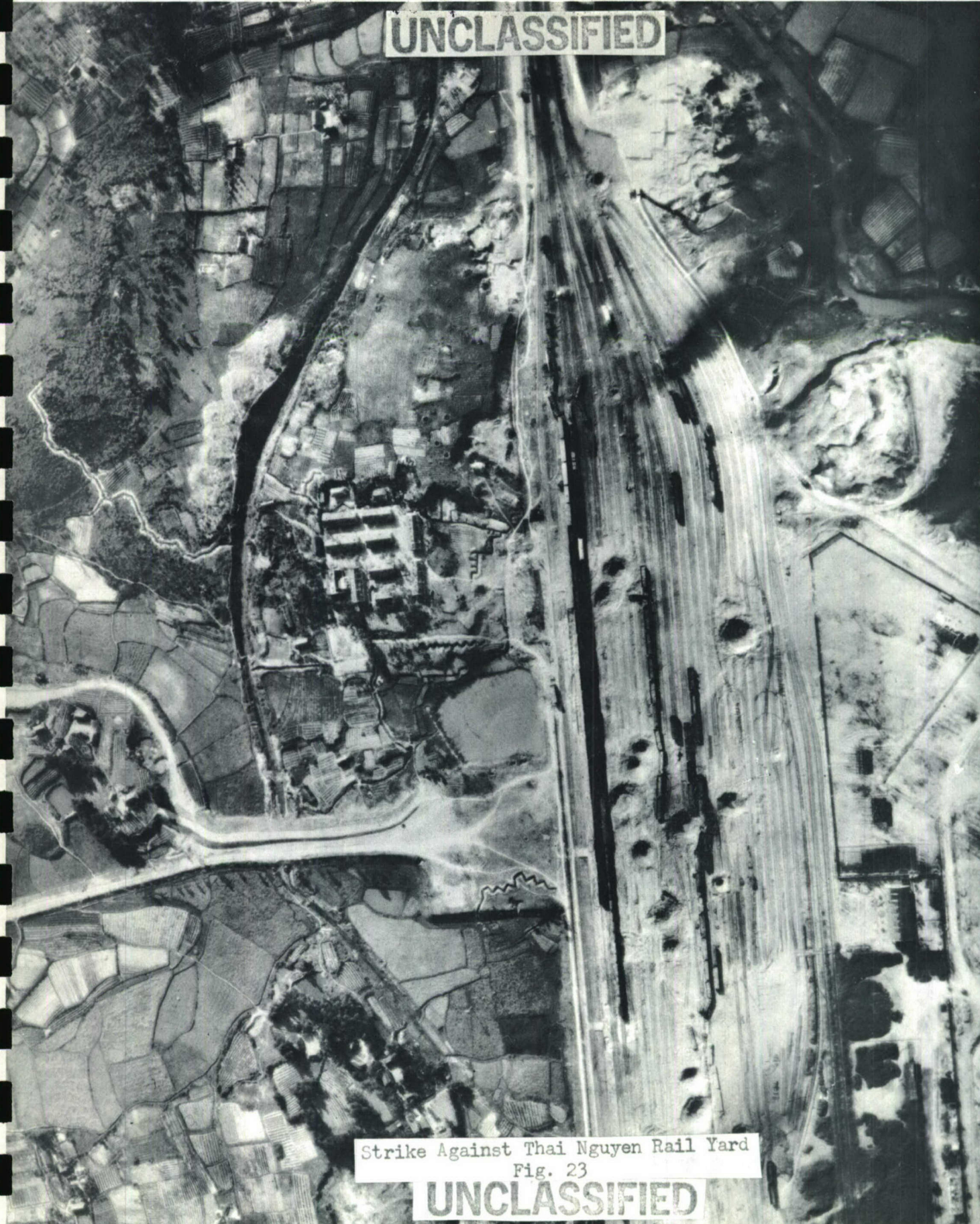
The following major objectives for 1967 were presented:

1. The NVN Government had to be convinced that a long war was an unacceptable and intolerable proposition.
2. War goods needed by the enemy in SVN had to be destroyed, wherever possible, at storage and distribution points in the northern part of the country with concurrent attrition along the LOC's leading to the south.

RAND Appraisal

A somewhat different appraisal of the impact of U.S. air operations against North Vietnam was contained in a RAND study published in December

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Strike Against Thai Nguyen Rail Yard
Fig. 23

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1966. With respect to the primary objective of the campaign, i.e., to reduce the level of infiltration or substantially increase the cost of infiltration of men and equipment from the north to the south, the study concluded that "although the bombing in North Vietnam and Laos raised the cost of infiltration, the level of infiltration has not been reduced sufficiently to prevent North Vietnam from helping to maintain a VC/PAVN combat force in the south strong enough to deny the prospect of a decisive military victory to the U.S. and its allies in the foreseeable future."^{16/}

The study addressed itself chiefly to the effects which air operations had on: (1) "The physical and organizational functioning of North Vietnam as an economic and political entity; and (2) "its 'coercive' effects, or its efficacy in reducing the Hanoi Government to agree to negotiations, on initial terms acceptable to the U.S." With respect to (1) above, the study stated the bombing had imposed severe strains which were manifested most tangibly by the massive diversion of manpower to military and other war-related unproductive activities. The country's ability to feed itself in a long war had been seriously impaired and there was evidence of urban food shortage and increasing food imports. But there was "no evidence of critical or progressive deterioration or disruption of economic activity." As far as the effects of the bombing on public morale and government control, the study made a "cautious 'guess' that they had redounded to the regime's net benefit." There was "no evidence at present that, economically and politically, Hanoi should not be able to withstand the long, hard war it professes to have in mind."^{17/}

[REDACTED]

The study pointed out that the main policy constraints on air operations were: (1) Keeping civilian casualties to a minimum; (2) limiting attacks to "military objectives," and (3) avoiding any actions which might provoke China or the USSR into more direct involvement. The relaxation of constraints, even to the extent of bombing all military and industrial targets not previously attacked, would be unlikely to achieve U.S. objectives unless it cut off Hanoi's access to military and economic aid imports from its communist allies. It further stated that: "U.S. failure to date to undertake a maximum effort to deny access to imports by sea and over land -- attributable evidently, mainly to the fear of provoking and activating the USSR and China -- thus emerges as the outstanding gap in the logic of U.S. coercive strategy against North Vietnam." But even if the U.S. were willing to abandon the "crucial constraint against direct maximum interdiction of imports into the DRV, ... there would still remain the question whether the physical and political effects on the DRV would make themselves decisively felt 'within an acceptable period of time'." There would also arise the graver question of the external effects of such action in terms of Soviet and Chinese reactions." While taking certain qualifications into considerations, the study nevertheless concluded that "as long as the present constraints on objectives and operations remain as strong as recent Administration statements indicate, it becomes increasingly doubtful that the advantage of continuation or intensification of the attacks outweigh the potential net gains from cessation or, at least, drastic and demonstrative de-escalation."^{18/}

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FOOTNOTES

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5. Ibid.
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7. (S) Pub., Hq PACAF, Effects of Air Operations in SEA, 5 Aug 1965.
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9. (TS) Pub., Hq PACAF (DTE), Summary of Air Operations in SEA, 16 Aug-2 Sep 1965.
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13. Ibid.
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31. (TS) Pub., Hq PACAF (DTE), Summary of Air Operations in SEA, 12-25 Nov 1965.
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GLOSSARY

AA	Antiaircraft
AAA	Antiaircraft artillery
ABCCC	Airborne command and control center
AFCC	Air Force Component Commander
AOB	Air Order of Battle
BARCAP	Barrier Combat Patrol (Navy)
BARREL ROLL	Air operations in NW Laos
BDA	Bomb damage assessment
BIG EYE	High-cover radar ECM
BLUE TREE	Photo reconnaissance
BR	See BARREL ROLL
Bullpup	Air-to-ground missile
CAP	Combat air patrol (SARCAP, MIGCAP, RESCAP, etc.)
CBU	Cluster bomb unit
Chicom	Chinese Communist
CINCPAC	Commander-in-Chief, Pacific
CINCPACAF	Commander-in-Chief, Pacific Air Forces
CINCPACFLT	Commander-in-Chief, Pacific Fleet
CINCSAC	Commander-in-Chief, Strategic Air Command
COMUSMACV	Commander, U.S. Military Assistance Command, Vietnam
CTF	Commander, Task Force (U.S. Navy)
CTZ	Corps Tactical Zone, (U.S. Army)
CVA	Aircraft Carrier (Navy)
DIA	Defense Intelligence Agency
DIT	Dispersed or isolated target
DMZ	Demilitarized Zone
ECM	Electronic Countermeasure(s)
ELINT	Electronic Intelligence
EOB	Electronic Order of Battle
EW	Electronic Warfare or Early Warning
FAC	Forward Air Controller
FWMAF	Free World Military Assistance Forces
GCI	Ground-controlled intercept (radar)
GVN	Government of South Vietnam

~~TOP SECRET~~

IRON HAND	Anti-SAM electronic operations
JCS	Joint Chiefs of Staff
LOC	Line(s) of Communication
MACV	See COMUSMACV
MIGCAP	MIG combat air patrol
MT or mt	Metric tons
NM or nm	Nautical mile(s)
NVA	North Vietnamese Army
NVN	North Vietnam(ese)
OPREP	Operations report
PACAF	Pacific Air Forces
PACFLT	Pacific Fleet
PACOM	Pacific Command
PIP	Primary Interdiction Point
POL	Petroleum, oil and lubricants
RHAW	Radar homing and warning
RLAF	Royal Laotian Air Force
ROLLING THUNDER	Air strike operations in North Vietnam
RP	Route Package
RT	See ROLLING THUNDER
RVN	Republic of Vietnam (also GVN or SVN)
SA-2	Type of surface-to-air missile
SAC	Strategic Air Command
SAM	Surface-to-Air Missile
SAR	Search and rescue
SARCAP	Search and rescue combat air patrol
SecDef	Secretary of Defense
SEA	Southeast Asia
SIP	Selected Interdiction Point
SL	See STEEL TIGER
STEEL TIGER	Air operations in S. Laos
SVN	South Vietnam

~~TOP SECRET NOFORN~~

TFW	Tactical Fighter Wing
TIGER HOUND	Air operations in S. Laos
TOT	Time over target
UE	See BLUE TREE
USIB	U.S. Intelligence Board
VC	Viet Cong
VNAF	South Vietnamese Air Force
VTD	Variable time delay (bomb fuse)
WILD WEASEL	ECM-equipped aircraft (anti-SAM or gun-laying radar)

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