REPORT ON THE WAR IN VIETNAM

COMMANDER IN CHIEF PACIFIC

COMMANDER
U.S. MILITARY ASSISTANCE COMMAND
VIETNAM

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REPORT ON THE WAR IN VIETNAM

(AS OF 30 JUNE 1968)

Section I

REPORT ON AIR AND NAVAL CAMPAIGNS AGAINST NORTH VIETNAM AND PACIFIC COMMAND-WIDE SUPPORT OF THE WAR
JUNE 1964–JULY 1968

By

ADMIRAL U. S. G. SHARP, USN
COMMANDER IN CHIEF PACIFIC

Section II

REPORT ON OPERATIONS IN SOUTH VIETNAM
JANUARY 1964–JUNE 1968

By

GENERAL W. C. WESTMORELAND, USA
COMMANDER, U.S. MILITARY ASSISTANCE
COMMAND, VIETNAM

PREFACE

This is a report on the Vietnam War by Admiral U. S. Grant Sharp, Commander in Chief Pacific (CINCPAC), and General William C. Westmoreland, Commander, United States Military Assistance Command, Vietnam (COMUSMACV). It covers events up to 30 June 1968.

Because of security considerations for military operations still underway in Vietnam, classified information on the war has not been included. This does not detract significantly from the report's usefulness as a record of the struggle against Communist aggression in South Vietnam.

The report is in four parts: CINCPAC's account of the air and naval campaign against North Vietnam, Pacific Command-wide efforts in support of the war, COMUSMACV's command account of the war in South Vietnam, and a prologue that welds the other three parts together.

More comprehensive but classified reports are prepared annually by CINCPAC and COMUSMACV for official use. These reports are available only on a "need to know" basis, and will remain so for the foreseeable future. The present report will serve in the interim as an additional current reference on the Vietnam War.

My viewpoint of the war in Vietnam is conditioned first of all by the comprehensive nature of CINCPAC's responsibilities in the entire Pacific and Asian area. As CINCPAC, I was responsible for all United States military operations—naval, ground, and air—in this entire region. Therefore, while Vietnam has been the focal point of our military effort in the Pacific Command, I have, by command necessity, viewed that conflict against the broader perspective of United States national interests throughout the area.

Our operations in Vietnam have been conducted to block Communist aggression in Southeast Asia, but this aggression is only the most visible portion of the Communist threat to United States security interests in the Pacific. Less obvious components of the total Communist threat are manifested by the provocative actions of North Korea, the mounting pressures of the North Vietnamese presence in Laos and Cambodia, and the rising level of Communist inspired insurgency in Thailand and Burma. These situations have required careful and continuing evaluation to insure the most efficient allocation of available resources in the Pacific Command to conduct the war in Vietnam and, at the same time, the protection of vital United States interests in an area

stretching from the Bering Sea in the north to the eastern Indian Ocean in the south.

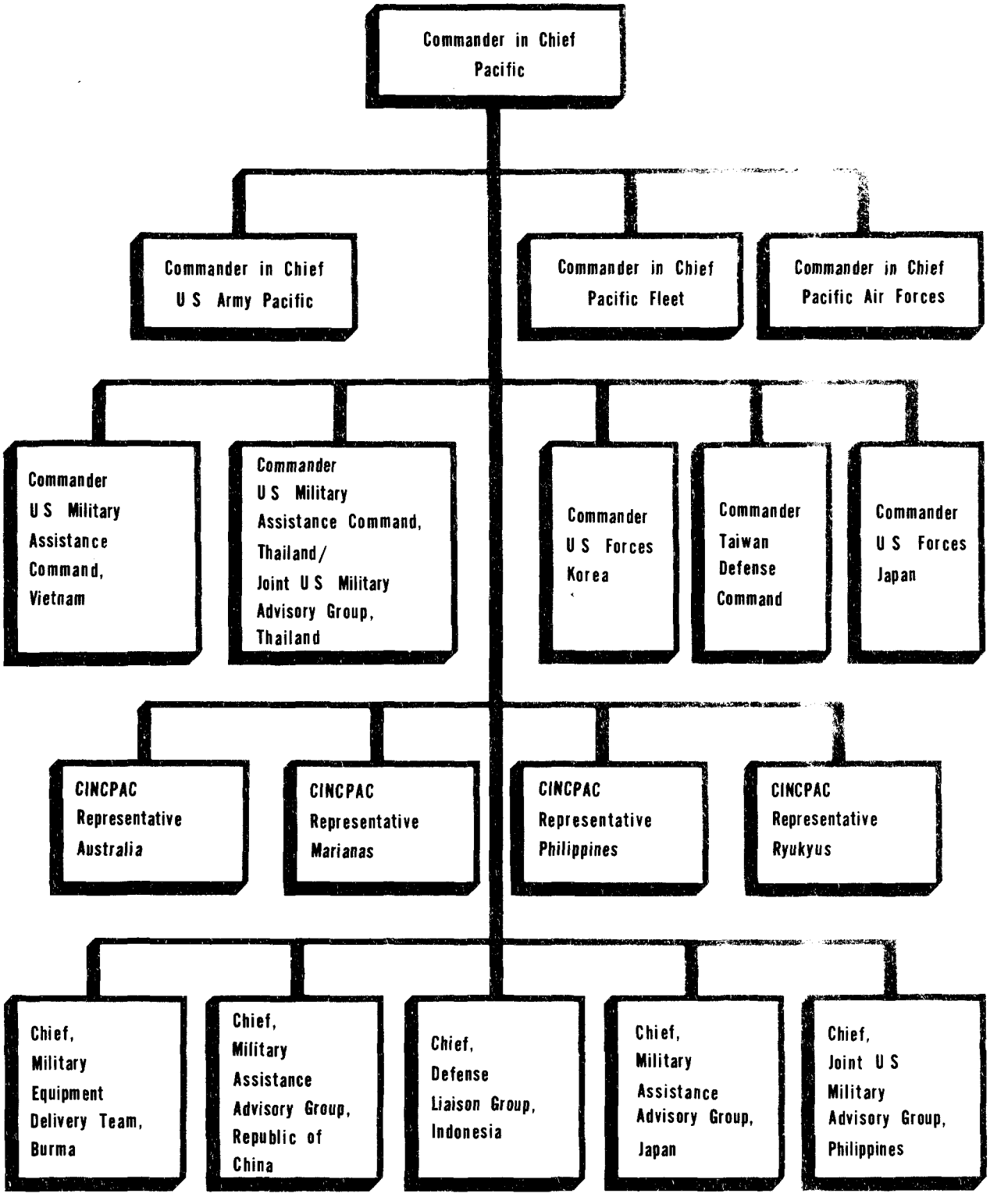
To meet the pervasive Communist threat, CINCPAC and his Pacific Command Service component commanders and subordinate unified commanders have developed a vast and complex support structure to provide the basis for Southeast Asia operations and continued United States operations in other areas. This support structure is necessary for the deployment of Free World forces to South Vietnam and provides a readiness posture to assure an adequate and flexible response to any threat to United States vital interests.

During the period covered by this report, the war in Vietnam has been the major part of the total CINCPAC effort to protect vital United States interests in the Pacific, and of the total national effort to protect American interests throughout the world.

The success of our efforts in Vietnam and throughout the Pacific has been dependent to a large degree upon the outstanding support and cooperation of an array of commands and agencies external to the Pacific Command. This report does not detail the extent of their participation but due recognition must be given their significant contribution to the total effort involved.

U. S. G. SHARP

COMMAND STRUCTURE



CONTENTS

PROLOGUE

Every war has its own distinctive features. The Vietnam War has been characterized by an invading army that denied its own existence, by guerrilla fighters who lived among the people they threatened, by the employment of highly sophisticated modern Communist weapons systems, and by carefully controlled limitations on the activities of American field commanders imposed less by the capabilities of their own forces and weapons than by considerations of international politics.

For over 20 years South Vietnam has fought to preserve its freedom against unremitting, ruthless aggression. The aggression has been no less real for the fact that it has been by Vietnamese against Vietnamese and by techniques of subversion, infiltration, terror, and attack rather than overt invasion on the classic pattern. The military effort which we and our allies have mounted in assistance to our Vietnamese ally has been one of constant innovation in resistance to a form of attack new in our experience.

In one way this war has not differed from others. The tests of battle have been met by our fighting men with unsurpassed dedication and courage, upholding the finest traditions of our military services.

The Vietnam War has had the most intense press coverage and has been the most thoroughly documented, most centrally controlled, most computerized, and most statistically analyzed in history. This was due in part to the necessity to measure the progress of a war in which there were no clearly drawn battle lines—no front, no safe rear. Because so much has been publicized about the war, this report contains no accounts that have not been reported before, nor revelations not previously expressed. Our goals, our efforts to meet them, our achievements, and our reversals are all part of the public record.

The weapons in this war have ranged from sharpened bamboo sticks through the entire spectrum of modern conventional weapons. Through an evolutionary growth reaching astounding proportions, the war has had one underlying theme—North Vietnam, supported by world Communist interests, has maintained a fierce determination to take over the government and people of South Vietnam, at whatever cost in lives or material. The Communists initially attempted to gain control by subversive methods—simple terrorism and assassination. When those techniques met strong resistance, Hanoi applied all of its resources and all of the aid it could accommodate from its allies, resorting to overt aggression. This report will sketch the profile of this Communist aggression and outline what we have done to counter it.

The United States had no desire to become involved in a war in Asia. One reason we did not send troops to Indochina at the end of World War II to support the French effort to regain control was that we did not want to help reinstate a colonial authority. The indigenous anti-French resistance, which began in late 1946, was not just a nationalist movement, although it sometimes took that guise. The Viet Minh had been organized in 1941 as a coalition of various groups—Democrats, Socialists, Communists, and other less well-defined sections of the independence movement. Its organization was dominated by the Communists, led by Ho Chi Minh who had been trained in Moscow.

The war in Korea later proved to the world the seriousness of the threat of Asian Communism and in the early 1950's, after the Viet Minh had revealed itself as an instrument of communism, the United States, therefore, started sending more military aid to France for use against the Communist Viet Minh.

GENEVA—1954

Despite this aid, France's attempt to reinstate colonial rule in Indochina was already failing when the United States, Great Britain, the USSR, and France met in Geneva in 1954. They sought a political settlement in Korea and a truce in Indochina. In May while the conference was in progress, General Vo Nguyen Giap and his Viet Minh forces defeated the besieged French forces at Dien Bien Phu and with this defeat the French decided to leave Indochina.

At Geneva, agreement was reached to partition Vietnam near the 17th Parallel with a provisional demarcation line cushioned by a demilitarized zone. Neither North nor South Vietnam was to interfere with the internal affairs of the other. Elections to reunify the two parts were to be held within two years of the signing.

Of great importance was the agreement banning the introduction of new troops and weapons or the establishment of new military bases. The manpower and materiel already in Vietnam could be replaced but not augmented, according to the treaty. Neighboring Laos and Cambodia were barred from military alliances, and foreign bases in either country were prohibited. All Viet Minh and French troops were to be withdrawn from both countries. To enforce the terms of the armistice, a three-country International Control Commission was created.

The United States and Vietnam did not sign the Geneva Accords, but endorsed them in principle and adhered to them in action until Communist violations had emptied them of meaning and rendered the International Control Commission powerless.

President Eisenhower, speaking for the United States, on 10 October 1954 offered "to assist the Government of Vietnam in developing and maintaining a strong, viable state, capable of resisting attempted subversion or aggression through military means" in the hope "that such aid, combined with . . . continuing efforts, will contribute effectively toward an independent Vietnam endowed with a strong government." Our involvement stems from this commitment.

DETERIORATION OF THE SITUATION IN SOUTH VIETNAM

North Vietnam hoped that the newly formed South Vietnamese Government would, if given enough time, fall of its own accord. The Hanoi leaders were ready to step into the resulting political void and reap a cheap victory. Such was not to be the case, however, for in the years immediately following the cessation of hostilities the Republic of Vietnam, beset though it was with problems, made steady if unspectacular progress.

The Geneva Accords called for national elections in both parts of Vietnam. But in 1956 the Saigon government refused to hold elections in South Vietnam on the grounds that elections in North Vietnam under the Communists would not guarantee the voters a free choice.

Hanoi had not anticipated this and now set about to gain control of the South by other means. The Viet Minh had left many cadres in the South in 1954. Under Hanoi's orders, they were organized into a political-paramilitary organization.

In 1960 the Central Committee of the Lao Dong Party, the Communist Party of North Vietnam, passed a resolution that South Vietnam was to be "liberated" and that North and South Vietnam were to be unified under a "progressive socialist" administration.

The Hanoi radio then announced the formation in South Vietnam of the National Front for the Liberation of South Vietnam, a front which Hanoi claimed was made up of several political parties of South Vietnamese. Subsequent Hanoi broadcasts identified a "People's Revolutionary Party" as the

leading party in this so-called front. It is significant that no announcement of this came out of South Vietnam, and no nationally-known South Vietnamese figure was ever identified with any of the political parties, which were on paper only, mentioned by the Hanoi radio.

Now the insurgent effort was infused with new cadres from the North—South Vietnamese who went, or were taken, North after the 1954 armistice.

The new organization, referred to as the Viet Cong, talked of land reform, a benevolent socialism, freedom from taxes, and the evils of American capitalistic influence. In some areas the Viet Cong were accepted by the people and the organization established local councils. Where the people rejected the Viet Cong, terrorism and armed attack were applied.

All the while, the Viet Cong were strengthening their organization, acquiring arms and experience. A cold-blooded campaign of elimination of local and national government officials, doctors, school teachers, and public health workers was instituted. This campaign, and the turbulent situation within the Saigon government, left the country weakened.

The overthrow and assassination of the country's first President, Ngo Dinh Diem, in late 1963 was the prelude to a series of rapidly changing governments. Internal ethnic and religious differences were exacerbated—often by the Communists—and plagued the country during these years. One consistent factor, however, was that all leaders of the various governments asked for increasing military assistance from the United States, for they knew that without it their country could not survive against the determined efforts of North Vietnam to take over South Vietnam.

The Communists exploited the confusion in South Vietnam whenever they could. Still, the insurgents in the South, despite their support from the North, were not able to gain full control of the country. In 1964 Hanoi decided that the introduction of battle-ready North Vietnamese Army Regulars was needed to bring about the defeat of the South.

The troops left their North Vietnamese training bases for what was often a clandestine journey of many months along the trails through Laos and Cambodia (a trail system named for their President, Ho Chi Minh) or infiltrated the zone which had been "demilitarized" at Geneva. They often remained in areas across the South Vietnamese border, where they were safe from South Vietnamese forces, until they were ready to invade. Although the Geneva Accords prohibited the presence of foreign troops in Laos or Cambodia, this did not inhibit the Communists.

Arrivals of United States advisors requested by the government of South Vietnam were announced on the front pages of the world's newspapers. Movement of the Communist forces was made secretly under cover of night and the jungle. The arrival of the Communists and their increasingly advanced weapons often could not be detected until they were met in battle.

For this reason, facts regarding troop escalation lagged behind the estimates. We were able to estimate rates of infiltration, however, and found continuing increases. Until mid-1964 the majority of the infiltrees were ethnic South Vietnamese members of the Viet Minh who had regrouped to the North after the 1954 cease-fire. In late 1964 the number of infiltrators began to increase greatly as regular North Vietnamese soldiers began to be introduced. By the end of 1964 a minimum of 12,000 North Vietnamese had been infiltrated, including the first North Vietnamese Army regiment to come as a unit. In the ensuing years large unit infiltrations have been the rule. As of June 1968 we estimate that more than 300,000 North Vietnamese troops have entered South Vietnam.

THE COMMUNIST AID PROGRAM

North Vietnam could not have supported such a military effort alone. During the period 1954 through 1967, assistance to North Vietnam from other Communist countries totaled some $2.9 bil-

lion, most of which came from the USSR. Annual aid agreements with the USSR, Communist China, North Korea, Mongolia, Rumania, Bulgaria, and Cuba have underscored Hanoi's heavy dependence on this outside aid, both to maintain essential production and services and to support the war in South Vietnam.

Russia has equipped North Vietnam with about 35 surface-to-air missile battalions and has supplied a sophisticated communications and radar network, numerous aircraft (including IL–28 jet light bombers and MIG–15, MIG–17, and MIG–21 fighter planes), and large quantities of antiaircraft weapons. All of these weapons contributed to establishing the most sophisticated air defense system ever faced by any force in combat. In addition, the USSR has supplied North Vietnam with modern ground force equipment such as 122- and 140-mm rockets, 120-mm mortars, and 130-mm field guns.

Priority attention has been given to North Vietnam's transportation system. The USSR has supplied not only a large portion of the vehicles needed to move supplies south, but also the road construction equipment needed to keep existing roads serviceable and to build new military roads in North Vietnam, Laos, and Viet Cong controlled areas of South Vietnam. In addition, the USSR has supplied railroad equipment, barges, bridge equipment, and petroleum for North Vietnam's transportation system.

Communist China's percentage of total aid has declined steadily since 1965. Such aid was significant, however, and has included the rehabilitation and development of North Vietnam's railways, highways, and communications facilities, reconstruction and improvement of irrigation systems, and construction of heavy and light industrial facilities. In 1966 it was reported that 40,000 Chinese were being used in North Vietnam for road and rail maintenance and other repair work. By early 1968 this figure had grown to 50,000. Some personnel were also believed to be in antiaircraft units. Military equipment from China continues to be mostly small arms, ammunition, and light antiaircraft artillery; but some MIG–17 jet fighters have been provided.

In the early stages of the war the enemy was handicapped by weapons and ammunition shortages and he relied often on homemade and captured items. Today there is an abundance of the latest models from the Communist conventional weapons arsenals.

SOUTH VIETNAM REQUESTS OUTSIDE ASSISTANCE

South Vietnam has also relied on massive external aid, from the United States and many other countries. In December 1961 South Vietnam sent an urgent appeal to President Kennedy for immediate further help. The President agreed to increase our military assistance. The political and military situation, however, continued to deteriorate. North Vietnam became emboldened by the eroding situation and misjudged American determination. American naval ships on patrol in the Gulf of Tonkin were involved in clashes with North Vietnamese torpedo boats on 2 and 4 August 1964, which led to approval of the Joint Congressional Resolution of 7 August 1964—the Tonkin Resolution—which not only approved retaliatory attacks but also stated that:

> *". . . the Congress approves and supports the determination of the President, as Commander-in-Chief, to take all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression. . . . The United States regards as vital to its national interest and to world peace the maintenance of international peace and security of Southeast Asia. Consonant with the Constitution and the Charter of the United Nations, and in accordance with its obligations under the Southeast Asia Collective Defense Treaty, the United States is, therefore, prepared, as the President determines, to take all necessary steps, including the use of armed force, to assist any member or protocol state of the Southeast Asia Collective Defense Treaty requesting assistance in defense of its freedom."*

UNITED STATES COMMITMENT OF FORCES

During January and February 1965 the general situation in South Vietnam continued to worsen,

the military threat increased, political tensions in Saigon deepened, and morale plummeted. It became increasingly apparent that the existing levels of United States aid could not prevent the collapse of South Vietnam. Even as deliberations on how best to deal with the situation were in progress within our government, the Viet Cong launched a series of attacks on American installations in South Vietnam. These attacks indicated that North Vietnam was moving in for the kill. It appeared that they would succeed, perhaps in a matter of months, as things were developing. Acting on the request of the South Vietnamese government, the decision was made to commit as soon as possible 125,000 United States troops to prevent the Communist takeover. At the same time President Johnson indicated that additional forces would be sent as requested by the Republic of Vietnam and the Commander of the United States Military Assistance Command, Vietnam.

As the need increased and as North Vietnam moved in more of its own troops, requests for additional United States troops followed. By December 1965 we had about 184,000 troops in Vietnam. The year of greatest buildup was 1966, when our strength more than doubled. Increases have since been at a slower rate but have continued.

SOUTHEAST ASIA TREATY ORGANIZATION REACTION

The SEATO Council and the Military Advisers, at each of their regular meetings since April 1964, condemned the Communist aggression and Hanoi-directed subversion of South Vietnam. The communiqués following these meetings have become progressively stronger in this regard. Each of the meetings was an occasion for the council to express its appreciation for the contributions from Free World nations assisting the South Vietnamese. The council further evinced its interest and growing concern, as well as support, for South Vietnam, a SEATO Protocol State, by encouraging increasing participation in its meetings by the South Vietnamese observer.

Each of the troop-contributing member nations of SEATO declared publicly that its support of South Vietnam was as a result of, and in accordance with, its obligations under the SEATO Treaty. The United Kingdom and France, though not contributing troops, contributed money, medical aid, technical assistance, and other forms of help.

The government of South Vietnam did not make a formal request for assistance from the Organization per se. Rather, such requests were made directly to each member nation individually. Significantly, all SEATO member nations, in one way or another and in varying degrees, assisted the South Vietnamese in their defense against Communist terrorism and aggression.

FREE WORLD ASSISTANCE TO SOUTH VIETNAM

In April 1964 President Johnson urged all the nations of the Free World to come to the assistance of South Vietnam. South Vietnam itself made formal requests to certain nations for assistance.

In response, nonmilitary assistance from 39 countries other than the United States totaled $55 million from April 1964 to June 1968. Most of those nations preferred to provide civic action and medical assistance rather than active military participation.

Prior to April 1964 Australia was the only nation other than the United States to supply military assistance. In 1962 Australia furnished a 30-man Army training team and in August 1964 augmented this team with an aviation detachment. In May 1965 Australia agreed to send a task force to South Vietnam and Australian forces there now total about 7,500 men.

In July 1964 New Zealand furnished a military engineer team and in May 1965 decided to replace this detachment with a combat force. New Zealand forces in 1968 totaled over 500.

Other than the United States the nation supplying the greatest assistance to the Republic of Vietnam is the Republic of Korea. By the end of

1965, 20,620 Korean troops were in South Vietnam and those forces now total approximately 50,000.

By the end of 1965 Thailand and the Republics of the Philippines and China also had given aid in the form of noncombatant personnel to act in either advisory or civic action roles. In addition, Canada, Japan, the Netherlands, the Federal Republic of Germany, and many other nations were contributing economic and technical assistance to South Vietnam, including many nonmilitary advisors and technicians.

In December 1966 a Royal Thai Government decision to assist in the ground war in Vietnam received enthusiastic support from the Thai people. The first element of the Royal Thai Army Volunteer Regiment arrived in Vietnam in July 1967 and the main body of approximately 2,500 men followed in September. Later in the year Thailand decided to send a division, with a total strength of over 11,000 men, to replace the Royal Thai Regiment. This division is scheduled to arrive in Vietnam in two increments, the first by August 1968. The second will follow upon completion of outfitting and training.

THE REPUBLIC OF VIETNAM'S ARMED FORCES

The Armed Forces of the Republic of Vietnam have been fighting without respite for many years. They have carried the heaviest load of casualties and the greatest personal hardships. Most Vietnamese soldiers have served their country gallantly, faithfully, and responsibly throughout the years. With the help and training of their allies they have acquired knowledge of modern military tactics and techniques, which they have applied effectively.

STRATEGY FOR THE CONDUCT OF THE WAR

Our basic objective in South Vietnam has been to establish a safe environment within which the people of South Vietnam could form a government that was independent, stable, and freely elected—one that would deserve and receive popular support. Such a government could not be created in an environment dominated by Communist terrorism. The Viet Cong and the North Vietnamese Army occupied large parts of the country and subjected large areas to armed attacks and acts of terrorism and assassination. These acts were most often directed at the representatives of government in provinces, villages, and hamlets throughout the countryside, the government officials most closely associated with the people.

The United States' military goal was to provide a secure environment in which the citizens could live and in which all levels of legal government could function without enemy exploitation, pressure, or violence. Our strategy to achieve this goal consisted of three interdependent elements—the ground and air campaign in South Vietnam, the nation building effort in South Vietnam, and our air and naval offensive against North Vietnam. Through these integrated efforts we have sought to convince the Hanoi regime that its aggression could not succeed and that such aggression would be too costly to sustain.

To this end United States, South Vietnamese, and other Free World forces went into battle to defeat the Communists and their organizations in South Vietnam. When the enemy was driven out of an area, United States and other Free World forces assisted the Vietnamese people in that area with projects such as building construction, sanitation, and medical care. Skills in these and other specialties were supplied by our soldiers, sailors, airmen, and Marines in their changing roles as both fighting men and workers in civic action.

But before major civic action programs could proceed, the enemy had to be blocked in his aggression. Efforts to defeat enemy aggression in South Vietnam will be detailed in another portion of this report.

As almost all of his war-making material came from or through North Vietnam, we took the war to the enemy by a vigorous and unremitting—but highly selective—application of our air and naval power. Aircraft from land bases in South Vietnam

and Thailand and from our aircraft carriers at sea applied this power. We attacked the enemy's military installations and power plants, petroleum products storage areas and industrial facilities which supported the war effort, and the vehicles and roads by which war material moved south—his means of provisioning the aggression. The bombing has been the most precise in history with less damage to nontargets and noncombatants than was ever experienced in previous wars. Communist support of the war was made extremely costly in terms of goods and facilities destroyed.

Our naval forces curbed the movement of men and their food and war-making material as they attempted to infiltrate by sea or by the great river systems of Southeast Asia. Naval gunfire assisted in coastal operations with marked effectiveness.

From a military standpoint, both air and naval programs were inhibited by restrictions growing out of the limited nature of our conduct of the war. The key port of Haiphong in North Vietnam, for example, through which 85 percent of North Vietnam's imports flowed, and at which ships of many nations called, has been a prohibited target. Our planes could not bomb it. Nor was mining of that harbor permitted. Materials shipped from Haiphong were sought out later and bombed on their journey south, when they could be found. The primitive road and trail networks of Southeast Asia and the frequently heavy tree cover made such moving targets and sheltered small storage areas very difficult to find, even with our sophisticated weapons and equipment.

Despite these difficulties, strikes on railroad lines, roads, and waterways greatly impeded the flow of war material. These attacks created additional management, distribution, and manpower problems for North Vietnam.

The bombing of North Vietnam was unilaterally stopped by the United States a number of times, for varying periods of time, in the hope that the enemy would respond by stopping his aggressive activities and reducing the scope and level of conflict. In every case the Communists used the bombing pause to rush troops and supplies to reinforce their army in South Vietnam. Such unilateral truce efforts, while judged politically desirable, accrued some temporary military disadvantages to successful prosecution of the war.

SUMMARY OF PROGRESS—1965 TO 1968

By mid-March 1965 United States forces were exerting pressure on Communist forces in South Vietnam and the United States logistic capability was expanding. In 1966 we commenced deployment of a balanced and effective combat force. Successful spoiling operations during that year prevented a Communist military takeover and forced the enemy to revert to defensive employment of his main force units. A capable and resourceful enemy continued overt warfare, however. He had developed a strong logistic base, much of it in neighboring Laos and Cambodia. The enemy maintained the capability to deploy substantial additional North Vietnamese Army Regulars.

While our air operations over North Vietnam attrited but did not prevent the introduction of external assistance into North Vietnam, substantial progress was made in destroying war supporting industries and resources. Emphasis was directed toward harassing, disrupting, and impeding the movement of men and material to South Vietnam. Such movement was made costly and the enemy was forced to exert a prodigious effort to continue it. He adjusted to our attacks by ingeniously hiding and dispersing his logistics activity, however, and his recuperative capability along the routes of movement was remarkable.

In 1966 we were able to take the initiative against Communist main force units in South Vietnam. However, the enemy was able to disengage many units and to seek refuge in sanctuaries in Laos, Cambodia, and North Vietnam, where our ground forces were not permitted to strike him. This permitted him to establish the pace of the ground war to his advantage. Although it would be erroneous to suggest that the enemy at this stage had reverted purely to guerrilla actions as his primary mode of

operations, he realized that he could not defeat and eject United States and Free World military forces by large unit operations. He was sufficiently flexible to hit at times and places of his choosing and under circumstances that offered a good probability of success. In 1966 the enemy's unit integrity had not been destroyed, nor had his logistic capabilities fallen below those needed to continue the war.

The Communists avoided major contact, using their sanctuaries, fighting defensively when forced to do so, and attempting to rebuild and reinforce for operations at an opportune time. Tactical guerrilla warfare was intensified without fragmenting main force units or discarding plans for their buildup and use. Hanoi continued the high rate of infiltration of Regular troops to replace losses and to augment units in the field. Enemy strategy hinged on continuing the war in the hope of outlasting our determination.

Another element of the Communists' basic strategy was a propaganda campaign directed at increasing both domestic and international pressure on the United States Government to stop the bombing of North Vietnam and to settle on terms favorable to the enemy.

By mid-1967 the combination of military operations against the enemy in all areas forced him to reassess his situation in light of his deteriorating military position. He was no longer capable of military victory. There were significant increases in the strength and capabilities of Allied forces in South Vietnam and combat operations were expanded accordingly. Our operations, supported by close air support and B–52 bomber strikes, increasingly neutralized enemy base areas, located and destroyed the supplies on which the enemy depended, and drove him into sparsely populated regions where food was scarce. The overall military trend in 1967 in enemy losses—those killed, wounded, and captured—was favorable to the allies, as was the overall trend in enemy defections. The number of persons and areas under Communist control declined slowly and the number of South Vietnamese impressed into Viet Cong service declined significantly. Consequently, the troop replacement burden fell increasingly on the North Vietnamese. There was evidence of manpower problems in North Vietnam, resulting in wider use of women in the labor force to free men badly needed for military replacements. Shortages of food, material, and medical supplies were taking their toll. Morale and combat effectiveness deteriorated in some of their units, especially those in isolated areas.

In 1967 the enemy did not win a major battle in South Vietnam. Many of his main force units had been driven to positions across the Laos and Cambodia borders where they took advantage of sanctuaries for protection and supply, in much the same way they had operated in 1965 and 1966 when hard pressed by our combat forces.

The Communist strategy continued to reflect an effort to draw Allied forces into remote areas, especially those areas adjacent to border sanctuaries, leaving populated areas unprotected. This enabled enemy local and guerrilla forces to harass, attack, and generally impede government efforts. Through these means the Viet Cong continued to exert a significant influence over large portions of the population. Although enemy capabilities were at times formidable in local areas, they were never overpowering. Through careful exploitation of the enemy's vulnerabilities and the application of our superior firepower and mobility, we were able to prevent him from making any spectacular gain in South Vietnam in 1967.

During 1967 the air and naval campaign against North Vietnam continued to be an element of our strategy in which we had the initiative. We continued to press this advantage. There was no doubt that our past efforts had hurt North Vietnam and that continued support of the war in South Vietnam was causing severe hardships. From a purely military view, additional operational latitude for air and naval forces would have enabled the execution of campaigns against North Vietnam which would have brought about a more rapid deteriora-

tion of the enemy's total war-supporting structure. If more effective curtailment of the Communist war effort had been achieved by drains on their resources, the result would have been a steady reduction of insurgency and aggression in South Vietnam.

In coordination with our military operations, the task of nation building in South Vietnam, the ultimate goal of our struggle, received its full share of attention. True, progress often was interrupted by enemy attacks or harassment, but the demonstration of government concern and aid for every village and hamlet in South Vietnam remained the aim. Efforts in this regard were not new. The French attempted *agrovilles* in the 1950's and the Diem regime tried a program of "strategic hamlets." These all failed for many reasons, not the least of which were failure to base goals on capabilities, to plan realistically, and to take into account the interests and aspirations of the people.

Subsequent efforts at nation building were more attuned to the needs of the people, but in 1966 growth was still slow and painstaking. Although the Vietnamese Armed Forces had the primary mission of supporting pacification, United States forces reinforced their efforts by direct support. Vietnamese Army units were redeployed and retrained to support these programs, but providing the motivation was difficult and progress in orienting those forces was slow.

In 1967 a new constitution was promulgated and the citizens of South Vietnam went to the polls and elected a new national government. Similarly, for the first time since the early days of the Diem regime, representative government was initiated at the village and hamlet level. There were fragmentary but nevertheless encouraging signs that the National Assembly was becoming constituent oriented.

Additionally, during 1967 there was a reorganization and consolidation of United States support of the pacification program. As a result the program was buttressed with added resources, increased military support, and unified civil-military staffing, thus creating a single, forcefully directed, United States pacification support effort.

Progress in the war from 1 January to 30 June 1968 can best be viewed in the context of the enemy's goals for his 1967–68 winter-spring campaign. Sometime in mid-1967 he revised his strategy in order to generate widespread internal uprisings, cause wholesale desertions from the ranks of South Vietnam's Army, and lay the groundwork for a political effort, including negotiations, along with his military effort to attain victory. The United States, the Communists hoped, faced with a collapsing ally, would lose the determination to pursue the war.

To carry out this new strategy, even larger numbers of North Vietnamese Regular Army troops and a heavier volume of supplies and equipment were infiltrated into South Vietnam. With the approach of *Tet,* the Vietnamese New Year season, the Communists felt that the time was ripe to go all out. They chose the first day of the *Tet* holidays for opening the offensive. Contrary to their expectations, the people of South Vietnam did not swing over to their side and there were few defections from the Vietnamese Army. Despite the surprise attack in violation of the Communists' own truce, the Vietnamese Army fought extremely well in throwing back the enemy while bearing the brunt of the assault. By coming out in the open, enemy troops were more vulnerable to our superior firepower, mobility, and flexibility. The result for the enemy was extremely high personnel losses. However, the tempo of the war was intensified. The enemy used new Soviet supplied rockets to initiate assaults on urban centers, notably Hue and Saigon, which were heretofore relatively free from attack.

During the first three months of 1968, the air campaign against North Vietnam was hampered by the rainy monsoon weather. As a result, most attack sorties were conducted against supply routes and military installations in southern North Vietnam.

On 1 April in a further attempt to get Hanoi to the peace conference table, the President of the

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United States stopped bombing attacks over the principal populated and food-producing areas of North Vietnam, except in the area north of the Demilitarized Zone where enemy actions directly threatened United States and other Free World forces in South Vietnam. Militarily, this action resulted in further concentration of attack sorties in southernmost North Vietnam, primarily directed at traffic on roads and trails, to try to keep reinforcements and supplies from reaching South Vietnam where they would be brought into battle against our forces. Politically, the President's action brought the response from the North Vietnamese that they would come to the conference table.

The enemy continued his countrywide attacks in an attempt to give the South Vietnamese and the world public an impression of North Vietnamese strength while exaggerating the human and material costs of the war to the Allied side. Our tactical aircraft and B–52 bombers continued their support of ground operations in South Vietnam with B–52 effort concentrating primarily on truck parks, storage areas, and troop concentrations. The air effort further compounded the enemy's difficulties in getting supplies and equipment down the infiltration routes.

In early May the Communists mounted further harassing attacks throughout South Vietnam with primary emphasis on the Saigon area and in the northern part of the country. Because of their earlier *Tet* losses, these attacks were not nearly as fierce or well coordinated as the *Tet* offensive. The results, however, were essentially the same—heavy losses for the enemy, a broadening of the war into urban areas, and a quantum jump in civilian casualties. Still, the enemy continued to reconstitute and reposition his forces for further attacks.

Then in late May and early June 1968 the enemy launched new assaults, particularly on the city of Saigon. American military installations and Vietnamese government headquarters seemed to be the initial objectives, although again the enemy showed complete disregard for the lives of innocent South Vietnamese civilians. When these attacks were blunted, the enemy commenced a series of indiscriminate rocket attacks against the civilian populace of Saigon, creating widespread destruction, heavy civilian casualties, and increasing numbers of refugees. These assaults on Saigon obviously were designed to influence the talks that had begun on 13 May in Paris, where Hanoi showed no disposition to modify its hardline stand.

As of 30 June our estimate is that the enemy does not possess the means of achieving military victory in South Vietnam but he does retain a dangerous capability to mount serious attacks. There is no indication that he has abandoned his goal of a unified Communist Vietnam. Against the backdrop of the Paris talks, a major victory would loom large. The enemy no doubt remembers how well a combined military and political strategy worked for him in Geneva 14 years ago.

AIR AND NAVAL CAMPAIGNS AGAINST NORTH VIETNAM

By August 1964 the Viet Cong, strongly supported by regular units of the North Vietnamese Army, held the military initiative in South Vietnam, controlled much of the rural area, had seriously reduced the effectiveness of the South Vietnamese government's pacification program, and appeared to be building up to a final push against the largely demoralized armed forces and unstable government.

The Viet Cong were accomplishing these successes despite our ever increasing economic aid, training programs by our military advisors, and our combat support personnel serving with the Armed Forces of the Republic of Vietnam.

In keeping with normal military intelligence collection requirements, routine naval patrols had been periodically operating in international waters off the coast of North Vietnam observing junk traffic and naval activity, and collecting hydrographic data and intelligence concerning North Vietnamese electronic installations which might become necessary to United States forces in the event of hostilities. One such patrol was proposed in early 1964 for reconnaissance off the North Vietnamese coastline. The recommendation was approved with the patrol to start not later than 31 July 1964.

In the late afternoon of 2 August, about 28 miles off the coast of North Vietnam and on a course away from the coast, the radar of the destroyer *Maddox* detected three boats closing on the ship at high speed. Despite evasive action, the boats by their maneuvers demonstrated hostile intent. The *Maddox* fired three warning shots and, when that did not deter the attackers, opened destructive fire with its five-inch guns. One boat was disabled but managed to launch what appeared to be two torpedoes, which missed by approximately 200 yards. Another boat retired to the north and lost all power. The third boat, hit at least once, passed approximately 1,700 yards astern of the *Maddox* firing a machine gun. One of the 12.7-mm projectiles ricocheted into a ready service magazine. Aircraft from the carrier *Ticonderoga,* then in the Gulf of Tonkin, joined the action, and the *Maddox* broke off pursuit of its attackers. No further contact was made and the carrier aircraft and the *Maddox* retired from the area. This was an unprovoked attack on a ship of the United States on the high seas.

The next day the President warned North Vietnam that "United States ships have traditionally operated freely on the high seas in accordance with the rights guaranteed by international law . . . . "They will," he said, "continue to do so and will take whatever measures are appropriate for their defense." He further warned that "The United States Government expects that . . . North Vietnam will be under no misapprehension as to the grave consequences which would inevitably result from any further unprovoked military action against United States forces."

In accordance with a Presidential directive, the Tonkin Gulf patrol was reinforced by a second destroyer, the *C. Turner Joy,* and during daylight hours by a combat air patrol from the *Ticonderoga* operating off northern South Vietnam. To reduce the risk of night torpedo boat attacks, the two ships were ordered to retire each afternoon to a "night steaming area" 24 miles square, centered about 100 miles offshore.

On 3 August the *Maddox* and the *C. Turner Joy* entered the Gulf of Tonkin. On the evening of 4 August 1964 the two destroyers were proceeding on an easterly course at a speed of about 20 knots. Shortly after dark, the task group commander, aboard the *Maddox,* observed on the surface search radar at least five contacts at about 36 miles distance, which he evaluated as probable torpedo boats. The *Maddox* and the *C. Turner Joy* changed course and increased speed to avoid what appeared to be an attack.

About an hour later, both ships' radars held contacts approximately 14 miles to the east. At that time the two United States ships were approximately 60 miles from the North Vietnamese coast. When it became evident from the maneuvers of the approaching enemy craft that they were pressing in for an attack position, both *Maddox* and *C. Turner Joy* opened fire. At this time, the enemy boats were at a range of 6,000 yards from the *Maddox* when the radar tracking indicated that the contact had turned away and began to open range. Torpedo noises were then heard by the *Maddox*'s sonar and this information was immediately passed to the *C. Turner Joy,* at which time both ships took evasive action to avoid the torpedo. A torpedo wake was then sighted passing abeam of the *C. Turner Joy,* approximately 300 feet to port and on the same bearing as the *Maddox.*

One target was taken under fire by the *C. Turner Joy,* numerous hits were observed, and it then disappeared from all radars. The commanding officer and other *C. Turner Joy* personnel observed a thick column of black smoke from this target.

Later, but during the attack, a searchlight was observed and was seen to swing in an arc toward the *C. Turner Joy.* The searchlight was immediately extinguished when aircraft from the combat air patrol orbiting above the ships approached the vicinity of the boat.

The silhouette of an attacking boat was also seen when the boat came between the ship and the flares dropped by an aircraft.

In addition, two aircraft at altitudes of between 700 and 1,500 feet, in the vicinity of the two destroyers at the time of the torpedo attack, sighted gun flashes on the surface of the water as well as light antiaircraft bursts near their altitude. On one pass over the two destroyers both pilots positively sighted a "snakey" high speed wake one and one-half miles ahead of the lead destroyer, the *Maddox.*

At approximately midnight the action ended when radar contact was lost on the last enemy boat. Best estimates were that at least two of the enemy craft were sunk, possibly two more damaged. There was no damage to the United States destroyers.

Less than half an hour after the termination of the second attack on the patrol, CINCPAC recommended that authority be granted for immediate punitive air strikes against North Vietnam. Two hours later, a message from the Joint Chiefs of Staff alerted us to plan strikes for first light the following day.

At the same time that the strike order was issued by the Joint Chiefs of Staff, a series of comprehensive air and sea movements was undertaken to discourage enemy reaction to the attack.

At the time of launch of the strike aircraft on 5 August the President announced to the public that the United States was making a measured response to the North Vietnamese aggression but did not intend to start a war.

Sixty-four strike aircraft were launched from the aircraft carriers *Ticonderoga* and *Constellation.* They inflicted severe damage to the North Vietnamese gunboat and torpedo boat fleet, destroying eight and damaging 21 others. Smoke from the Vinh petroleum storage areas rose to 14,000 feet

and those stores were estimated to be 90 percent destroyed. The strikes were not without cost to our forces. Two of the aircraft from the *Constellation* were lost to antiaircraft defense at Hon Gai and two other aircraft were hit but recovered safely.

Immediately after the strikes on 5 August, Secretary of State Dean Rusk stated that the United States made its retaliatory air strikes in order to prevent a Communist "miscalculation" that we would not reply in kind. President Johnson also warned North Vietnam and Communist China against being "tempted . . . to widen the present aggression," and stated that there was "no immunity from reply."

The remainder of 1964 was characterized by increased readiness throughout the Pacific Command to meet any new North Vietnamese aggression. Extensive plans were made for future punitive or retaliatory strikes to be made in response to any renewed overt acts of aggression.

On Christmas Eve 1964 the Communists exploded a large demolition charge in the Brink Bachelor Officers Quarters in downtown Saigon. A second aircraft carrier was ordered to the Gulf of Tonkin and retaliatory strikes were readied but not executed.

NORTH VIETNAM'S AIR DEFENSE SYSTEM—1964

Events subsequent to our air strikes on 5 August 1964 in retaliation for the Gulf of Tonkin incidents revealed how prior training and prompt military and technical aid from other Communist countries served to turn a rudimentary air defense system into one of imposing capabilities. On 7 August two days after our strikes, aerial photography of Phuc Yen Airfield near Hanoi revealed the presence of MIG–15's and 17's. It was obvious from this rapid response that the aircraft came from Communist China. Hanoi evidently decided it was prudent to prepare for a long war. North Vietnamese aggression in South Vietnam was moving ahead rapidly and there was no telling when the United States might retaliate against the North again.

In early November 1964 North Vietnamese Premier Pham Van Dong visited Moscow, ostensibly to celebrate the 47th anniversary of the Bolshevik Revolution. His primary mission, however, was to request major material and technical support in building a modern air defense system.

The North Vietnamese air defense system on the eve of the Gulf of Tonkin incidents was of low effectiveness. The aircraft inventory consisted of some 30 trainers, 50 transports, and four light helicopters, none of which had effective air defense capabilities. The airfields were primarily oriented towards handling light and medium transport activity. Gia Lam Airfield at Hanoi and Cat Bi Airfield at Haiphong were the only two modern airfields capable of sustained jet operations, although Phuc Yen, also near Hanoi, was nearly completed. Two other airfields, Kien An at Haiphong and Dong Hoi, just north of the Demilitarized Zone, had hard-surfaced runways capable of supporting jet aircraft. There were no missiles for defense. Conventional antiaircraft weapons (some 700 of all types) provided the air defense capability and there was little radar tracking capability. The radar complex consisted of about 20 early warning sets with very little capability for definitive tracking. Overall air defense was limited to key population areas and military installations, and mainly restricted to altitudes below 20,000 feet.

AIR AND NAVAL ACTIONS AGAINST NORTH VIETNAM—1965

At the outset of 1965 our air forces were engaged only in limited combat operations in Southeast Asia, but by late January of that year, there was widespread conviction among senior United States and Vietnamese military commanders and civilian authorities in Vietnam that the absence of a United States response to Viet Cong and North Vietnamese attacks against our personnel and forces in South Vietnam would encourage further anti-United States incidents. With this in mind and with the approval of the Joint Chiefs of Staff, an operation order—nicknamed FLAMING DART—was developed to detail the military actions for retaliatory air strikes to be executed on order of higher authority.

One destroyer patrol, ordered into the Tonkin Gulf, was scheduled to begin on 7 February. However, it developed that this was the date of a state visit by Soviet Premier Alexei N. Kosygin to Hanoi and the patrol was cancelled in order to avoid any incident that might worsen United States-Soviet relations. In addition to cancelling the naval patrol in the Gulf, the attack carriers *Coral Sea* and *Hancock* were ordered to stand down from a fully ready condition and on the morning of the seventh the two ships turned eastward for Subic Bay, leaving only the aircraft carrier *Ranger* in the Gulf of Tonkin.

Within hours of the release of the two carriers, the North Vietnamese-controlled Viet Cong launched a heavy mortar attack on United States forces and billets in the vicinity of the Pleiku Airbase. Eight Americans were killed, 109 wounded. This was the first of a series of Viet Cong attacks which coincided with Premier Kosygin's visit.

After this attack, our forces resumed promptly the operational readiness posture so recently relaxed. The aircraft carriers *Coral Sea* and *Hancock* were ordered to reverse course and steam toward the Tonkin Gulf. After alerting Pacific Command air and naval component commanders, CINCPAC informed the Joint Chiefs of Staff that our forces were ready to execute the FLAMING DART plan as appropriate retaliation. The Joint Chiefs of Staff responded promptly with "Execute" and the *Coral Sea* and the *Hancock* launched a total of 45 planes against North Vietnamese army barracks and port facilities at Dong Hoi, just north of the Demilitarized Zone.

Simultaneously the aircraft carrier *Ranger* launched a 34-plane strike against the Vit Thu Lu Barracks, 15 miles inland and five miles north of the Demilitarized Zone, but poor weather prevented these attacks from being carried out.

At Dong Hoi, ten buildings were destroyed, two others heavily damaged, and an undetermined number left burning. One A–4 Skyhawk and its pilot were lost.

Concurrent with these retaliatory actions, force augmentations of the Pacific Command were undertaken to deter or counter North Vietnamese or Chinese Communist reaction. At the same time, proposals were submitted to the Joint Chiefs of Staff to increase the military pressure against North Vietnam. CINCPAC proposed that our aircraft be authorized to participate on a continuing basis with the Vietnamese Air Force against the Viet Cong within South Vietnam, that frequent destroyer patrols be conducted in the Tonkin Gulf to place the Communists on the defensive in their

home grounds, and that fighter escort be authorized for photographic reconnaissance missions in the southern portion of North Vietnam.

With Ambassador to South Vietnam Maxwell Taylor and General Westmoreland supporting the retaliatory action and emphasizing the importance of South Vietnamese Air Force participation, the Joint Chiefs of Staff authorized an additional strike on 8 February with South Vietnamese Air Force resources against the Vu Con Barracks, with the Chap Le Barracks (about 15 miles north of the Demilitarized Zone) as an alternate target in case of bad weather. The South Vietnamese Air Force, in association with our pathfinder and flak suppression forces, executed a successful strike against the Chap Le Barracks with 24 A-1H aircraft.

On 10 February the enemy blew up a United States enlisted men's billet at Qui Nhon, killing 23 Americans and wounding 21 others. Immediately after this action, CINCPAC recommended to the Joint Chiefs of Staff that we retaliate promptly and emphatically, and included a proposal that the South Vietnamese Air Force be used to strike the Vu Con Barracks. Ambassador Taylor and General Westmoreland again were in agreement with our views.

In response to CINCPAC's recommendation, the Joint Chiefs of Staff issued a warning order to be prepared to conduct coordinated attacks during daylight hours on 11 February. The execution order from the Joint Chiefs of Staff assigned United States strike forces to the Chanh Hoa Barracks, 35 miles north of the Demilitarized Zone. The Vu Con Barracks was to be handled by the South Vietnamese Air Force.

On 11 February FLAMING DART TWO was launched. Weather conditions forced the South Vietnamese Air Force to attack its alternate target, the Vit Thu Lu Barracks, with resulting destruction of five buildings. The United States naval aircraft strike at Chanh Hoa Barracks was successful but our forces suffered the loss of three aircraft.

INCEPTION OF ROLLING THUNDER OPERATIONS

Until mid-February 1965 all United States and South Vietnamese Air Force air strikes against North Vietnam had been in response to specific Communist violence directed against our forces. However, at CINCPAC's direction, plans had been prepared to undertake a program of air strikes against North Vietnam, not necessarily related to retaliatory action, should such operations be ordered. The objective of the air strikes was to cause the government of North Vietnam to cease its support and direction of the insurgencies in South Vietnam and Laos.

Before such strikes could be launched, it was essential for the United States and its allies to make preparations for possible reaction by North Vietnam and Communist China. Some preparatory moves were accomplished in connection with the FLAMING DART air strikes to include the evacuation of American dependents from South Vietnam and augmentation of air power in Southeast Asia.

Although there were no further FLAMING DART actions, there was continued planning for additional air strikes. Higher authority, in response to continued and increasing aggression by North Vietnam, soon authorized the use of United States forces for an air strike against the Quang Khe Naval Base and recommended employment of South Vietnamese Air Force aircraft to strike the Dong Hoi Airfield (just north of the Demilitarized Zone). These strikes, with a planning readiness date of 20 February, were given the nickname ROLLING THUNDER. That name came to be applied to our air campaign against North Vietnam with different strike series numbered in sequence.

ROLLING THUNDER STRIKES BEGIN

On 2 March 1965 the first ROLLING THUNDER strikes were launched when United States aircraft hit a supply area and the Vietnamese Air Force struck a port complex. Strategic Air Command B–52 night air strikes were included in the warning order for ROLLING THUNDER 5, but SAC participation was not included in the execute message. SAC B–52 operations were not to become a part of ROLLING THUNDER but became a separate operation, ARC LIGHT.

ROLLING THUNDER operations were initiated under strict controls and specific guidance. The strike day was specified, as well as the number of sorties by task and by target; strikes were dependent on Vietnamese Air Force participation prior to or concurrent with United States strikes; attacks were limited to primary targets or one of two alternates with unexpended ordnance to be dumped into the South China Sea; prestrike reconnaissance was not permitted; bomb damage assessment aircraft were to accompany strike aircraft or immediately follow the strike aircraft; subsequent bomb damage assessment was to be conducted at medium altitude only and unescorted; and no aircraft were to be recycled.

As the ROLLING THUNDER campaign progressed, restrictions were gradually reduced and greater latitude in air operations was authorized. Within the approved boundaries, armed reconnaissance aircraft (originally prohibited from doing so) were permitted to hit enemy vehicles on roads and rail lines, aircraft or vehicles on certain airfields, North Vietnamese naval craft, water craft firing on aircraft, radar and communications facilities, surface-to-air missile sites and equipment, and barges, ferries, and lighters.

North Vietnam was divided into seven geographic regions, identified as Route Packages, for ROLLING THUNDER operations. They were designed for the purpose of assigning responsibility for target development, collection of intelligence data, and target analysis. To insure economical and effective use of resources, operational procedures were developed between our Seventh Air Force and Seventh Fleet that provided for full coordination of air operations in the ROLLING THUNDER program and yet allowed both Services to operate in all areas.

As ROLLING THUNDER progressed and the operational commanders were granted increased flexibility in conducting operations, the subordinate commanders were reminded of the unique character of the campaign. For example, in an April message to subordinate commanders, CINCPAC noted that in the day-to-day pressure of an operational environment it was not easy to remember that the air campaign in North Vietnam was not just another war with the objective of inflicting maximum damage to the enemy. ROLLING THUNDER was described as a precise application of military pressure for the specific purpose of halting aggression in South Vietnam, and that there was no doubt as to the damage the strikes had accomplished. CINCPAC's message emphasized that the commanders could continue to expect various types of restrictions on their operations, some explicitly stated, others implied, and that the fundamental importance of the air campaign, conducted as ordered, required careful compliance with the spirit and intent of each instruction.

ROLLING THUNDER STRIKES SUSPENDED

On 12 May 1965 air strike and armed reconnaissance operations within North Vietnam were suspended. Strike aircraft released by this move were made available for use against the Viet Cong within South Vietnam. A special reconnaissance program was launched to observe the reaction of the North Vietnamese rail and road transportation systems.

RECOMMENDED FUTURE COURSE FOR ROLLING THUNDER

During the bombing pause, a comprehensive recommendation on the future course of the air campaign was submitted to the Joint Chiefs of Staff. CINCPAC stated that in developing the future course of the campaign it was necessary to weigh carefully the capabilities and limitations of United States air power when required to operate within specific political parameters, and to weigh the vulnerability of North Vietnam within that framework. A concept was then proposed for a demonstration of the ubiquity of our air power, characterized by an around-the-clock program of immobilization, attrition, and harassment of North Vietnamese military targets. The specific types of missions proposed for this purpose were extensive daytime armed reconnaissance on land and inland waterway routes south of 20° North coupled with night blockage tactics; increased route interdiction south of 20° North; repeated attacks against known military facilities south of 20° North that could be effectively attacked by a small strike force; attacks that sought out and destroyed dispersed supplies, equipment, and military personnel; and attacks on port facilities and recognized North Vietnamese shipping.

As a desirable alternative CINCPAC recommended that incremental attacks be authorized on the larger targets over a period of days, to be supported by bomb damage assessment. This type of attack was to be conducted against major targets south of 20° North and later extended northwest to Dien Bien Phu.

Intensified psychological operations were also suggested as an important adjunct to ROLLING THUNDER. CINCPAC proposed specific measures to transmit the message that the United States had no quarrel with the people of North Vietnam and that they should avoid all military installations. The targets and "strike zones" proposed were

initially limited to the area from the Demilitarized Zone to 20° North, but these were to be extended to the northwest against specific targets. CINCPAC also recommended that, as the zone for strikes against major targets expanded to the north and west, the armed reconnaissance and small strike zone be expanded accordingly. In this plan, it was proposed to lift the numerical limit on armed reconnaissance sorties so that only our capability be considered in establishing the number of small, controlled air operations.

One purpose of this campaign was to drive home to the North Vietnamese leaders that our staying power was superior to their own.

ROLLING THUNDER STRIKES RESUMED

During the bombing suspension initiated in May 1965, information was collected to permit an evaluation of the results of ROLLING THUNDER. On 16 May CINCPAC suggested to the Joint Chiefs of Staff that further respite for North Vietnam would serve to make future problems more difficult in South Vietnam and Laos. On this basis CINCPAC recommended resumption of ROLLING THUNDER and received authorization from higher authority to resume operations on 18 May 1965.

Within ROLLING THUNDER 15, specified geographical areas were for the first time assigned for armed reconnaissance and one strike was authorized north of 20° North against Quang Suoi Barracks.

Continuing through the end of 1965, North Vietnamese military targets were subjected to air attack by ROLLING THUNDER operations. North Vietnamese freedom of troop and war supply movement was progressively impaired as the number and importance of ROLLING THUNDER fixed targets grew. The area and intensity of armed reconnaissance were expanded but at a carefully measured and moderate pace. By year's end, we had progressed from ROLLING THUNDER 16 on 25 May through ROLLING THUNDER 47, which was authorized on 24 December 1965.

EVALUATION OF ARMED RECONNAISSANCE

It was clear by September 1965 that despite the damage caused by air attacks in North Vietnam there was no indication of North Vietnamese willingness to negotiate or terminate support of the Viet Cong.

It must be noted that the principle of continual and steadily increasing pressure was basic to the concept of ROLLING THUNDER and thus to the achievement of our purposes through the use of air power. This principle had not been held to in the ROLLING THUNDER campaign, either in armed reconnaissance or in fixed target strikes. Armed reconnaissance sorties had leveled off for the two months previous to September 1965 and strikes on fixed targets had actually decreased.

The overall decrease in pressure was caused in part because the authorized armed reconnaissance area had fewer significant targets than before. Further, the reduced number of fixed targets for each succeeding ROLLING THUNDER period had lessened the pressure on North Vietnam. Finally, the most important targets were in the northeast and in the large sanctuaries around Hanoi and Haiphong, where air operations were not authorized.

On 26 November CINCPAC recommended destruction of major war supporting targets in the northeast, including those in the Hanoi and Haiphong areas, disruption of major port facilities, and subsequent increased armed reconnaissance directed at the road, rail, and coastal lines of communication from China and on inland waterways.

EXPANSION OF NORTH VIETNAM'S AIR DEFENSE SYSTEM—1965

In April 1965 photography revealed the first North Vietnamese surface-to-air missile (SAM) site under construction some 15 miles southeast of Hanoi. A second SAM site appeared about a month later and by mid-July 1965 several more sites had been discovered in various stages of construction, forming an incomplete irregular ring

around Hanoi. Neither missiles nor missile-associated equipment was detected in any of the sites. On 24 July 1965 the first known successful SAM firing from a North Vietnamese site occurred, resulting in the loss of an F–4C aircraft. Subsequently the number of SAM sites increased rapidly in the area north of Thanh Hoa. By the end of 1965, more than 60 sites had been discovered protecting the vital military-industrial complex around Hanoi and Haiphong and the LOC south to Thanh Hoa. The SAM threat forced our aircraft to operate below the minimum effective altitudes of the missile system. This required more fuel and placed the aircraft within the kill envelope of small arms, automatic weapons, and light antiaircraft artillery. Evaluation of the effectiveness of the SAM system for 1965 indicated it took about 13 missiles launched for each aircraft shot down.

As SAM defenses were increased and improved, so also was North Vietnam's aircraft inventory. In late May 1965 eight IL–28 jet light bombers were identified at Phuc Yen Airfield and by mid-June the number of MIG–15 and MIG–17 fighter aircraft had climbed to almost 70. At Phuc Yen, the presence of unpacked crates indicated that there were more aircraft awaiting assembly. In late December 1965 an improved supersonic fighter, the delta-winged MIG–21, arrived to bolster North Vietnam's air defenses. Combat aircraft activity during 1965 was mainly devoted to training and only ten fighter engagements were reported, resulting in a total of two United States and six North Vietnamese fighter aircraft downed. The IL–28's were not involved in combat missions. North Vietnam's aircraft inventory at the end of 1965 numbered about 75 MIG jet fighters and eight IL–28 jet light bombers.

The most effective elements of North Vietnam's air defense system proved to be the automatic weapons and antiaircraft artillery (AAA). Antiaircraft weapons were credited with destroying about 80 percent of our aircraft shot down in North Vietnam during 1965, with the most damaging fire from light AAA and automatic weapons. This rate was to be expected, considering low-level attacks by fighter-bombers and flak suppression tactics.

During 1965 North Vietnam accomplished a rapid buildup of early warning and height-finding radar sites. An initial ground controlled intercept (GCI) capability was established in both the northern and southern portions of the country and into the Gulf of Tonkin.

On 4 April MIG aircraft possibly under GCI control surprised and shot down two F–105's over Thanh Hoa. The number of AAA fire control radars increased during the year but not as fast as the number of AAA weapons. At the end of 1965 the ratio of radars to occupied AAA installations was no more than 1 to 25.

THAILAND BASED AIRCRAFT OPERATIONS

Thai bases were used for strike aircraft from the outset of the ROLLING THUNDER program and for reconnaissance missions in Laos. This arrangement existed with the full consent of the Thai Government. The use of Thailand-based aircraft for operations in North Vietnam and Laos helped relieve pressure on the already congested air bases in South Vietnam, introduced an added increment of flexibility into our air operations, and permitted sortie levels which otherwise would have taxed the capability of our resources.

THE VIETNAMESE AIR FORCE'S ROLE IN ROLLING THUNDER

South Vietnamese Air Force (VNAF) participation was a significant element in ROLLING THUNDER. However, heavy Viet Cong pressure tended to drain VNAF resources to meet requirements in South Vietnam at the expense of the campaign in North Vietnam. Diverting carrier aircraft and increasing United States Air Force attacks within South Vietnam relieved pressure on the VNAF, thereby permitting increased VNAF participation in ROLLING THUNDER. Subsequently, the VNAF provided a minimum of three strike/

reconnaissance missions for each of the ROLLING THUNDER periods.

COMMAND AND CONTROL FOR ROLLING THUNDER OPERATIONS

The command and control arrangement for ROLLING THUNDER strike and armed reconnaissance operations basically consisted of CINCPAC's operational control of the strike forces through the Commanders in Chief of the Pacific Fleet (CINCPACFLT) and Pacific Air Forces (CINCPACAF) and the Commander, United States Military Assistance Command, Vietnam (COMUSMACV). Coordination authority was assigned to CINCPACAF with the tacit understanding that it would be further delegated to the Commander of the 2d Air Division, located in South Vietnam. This authority was granted to the extent it was required to preclude mutual interference of friendly forces during strike and armed reconnaissance missions. A Seventh Fleet liaison officer to the 2d Air Division accomplished liaison with the Commander of Task Force 77, who exercised operational command and control over the aircraft carriers on station off the Vietnam coast. The Commander of the 2d Air Division exercised operational control for CINCPACAF over the Air Force forces in Southeast Asia engaged in combat air operations.

This system conformed to accepted doctrine for unified control of our forces and it functioned smoothly for this purpose. It provided an effective means of exercising coordination of air operations over North Vietnam without a combined command structure. Although there were refinements within this system, there was no fundamental change.

ORDNANCE EXPENDITURE

The general purpose bomb was the weapon against the majority of ROLLING THUNDER targets. The Navy used principally the 500-pound bomb; our Air Force relied mainly on the 750-pound bomb supplemented by the 500-pound bomb. Special targeting required limited numbers of 250-, 1,000-, 2,000-, and 3,000-pound bombs.

Throughout ROLLING THUNDER operations there was no case in which sorties were cancelled because weapons were unavailable. In some cases, however, the optimum weapons necessary for achievement of maximum damage per sortie were not used when local shortages required substitution of alternate weapons for those preferred.

Use of napalm against North Vietnam targets was prohibited until ROLLING THUNDER 6; thereafter it was employed only against specific military targets not adjacent to a population center.

LEAFLET OPERATIONS

The initial leaflet program aimed at the North Vietnamese was approved on 9 April 1965. The concept was that prior to an airstrike we would warn the populace, by leaflets or by radio, that certain categories of targets were considered military objectives and that the people should evacuate all targets of the type described. The first leaflet mission was conducted on 14 April.

In June Washington authorities granted to CINCPAC and to the American Ambassador in Saigon the authority to conduct leaflet drops as part of the total air effort. It was intended that the targets for ROLLING THUNDER and the leaflet missions would be complementary. Further, it was directed that the leaflet operations would be expanded to two drops of about two million leaflets each per week.

Intensified psychological operations were directed and on 16 July CINCPAC recommended that leaflet operations be conducted on the major North Vietnamese population centers, to include Hanoi and Haiphong. This was approved by higher authority with the proviso that leaflet aircraft could not penetrate a 40-nautical mile circle around either Hanoi or Haiphong. Leaflets for Hanoi and Haiphong were targeted utilizing the wind-drift technique.

Until the early part of September 1965 all leaflet missions were executed by F–105 aircraft. On 10

September a C–130 was used for the first time in the leaflet program. On this, the first night mission of the program, 9,000 packets containing toys were dropped over North Vietnam in connection with Children's Day.

Responding to an October query from the Joint Chiefs of Staff, CINCPAC again proposed a relaxation of restrictions on leaflet aircraft in the interest of more effective operations. CINCPAC's proposal provided that the less stringent constraints applicable to some of the other air operations be applied to leaflet missions. After approval by the Joint Chiefs of Staff, the basic operation order of 17 December broadened the area of operations but still restricted aircraft from entering a 25-nautical mile radius from Hanoi, a 10-nautical mile radius from Haiphong, and a distance varying from 25 to 30 nautical miles from the Chinese border.

A total of 77 million leaflets and 15,000 gift kits were distributed under the leaflet program during 1965. There were indications that the material was reaching the populace, that in some instances the morale of the people was being lowered, and that the North Vietnamese authorities were forced to take counterpropaganda actions. On this basis the leaflet operation was termed worthwhile.

Leaflet operations were suspended during the latter part of December as part of the Christmas stand-down.

HOLIDAY CEASE-FIRE—1965

The Viet Cong announced a Christmas "truce" in South Vietnam in 1965. On our side, Secretary of State Dean Rusk proposed that the United States suspend bombing operations against North Vietnam for 24 hours and that air operations in South Vietnam be limited to support of forces in contact with the Viet Cong. Should this result in a real and similar restraint on the part of the enemy, we would continue to suspend bombing in the hope that negotiations could begin. CINCPAC concurred in Secretary Rusk's proposal, feeling that such operations could be suspended without significant military advantage to the Viet Cong.

We announced that air operations would be suspended over North Vietnam for a 24-hour period over Christmas and, as circumstances would have it, they were not resumed until the end of January 1966. Air and ground operations in South Vietnam were limited to defensive actions during the 24-hour Christmas period. Subsequently, the ground cease-fire period was extended by six hours, and ended on 26 December.

The enemy did not observe his own announced truce. Casualties reported for the period 24 through 26 December as a result of enemy violations were 3 United States personnel killed and 23 wounded, 54 members of the South Vietnamese Armed Forces killed and 55 wounded, and 15 South Vietnamese civilians killed and 19 wounded.

On 26 December CINCPAC commented to the Joint Chiefs of Staff on the difficulties faced by a commander in the presence of the enemy when a cease-fire was extended on short notice. It was pointed out that the advantage of a cease-fire accrued to the enemy, suggested that any future cease-fire should be planned in detail well in advance, and proposed that aerial observation of key enemy installations in North Vietnam should continue even during a cease-fire.

EFFECTS DURING 1965

Initial ROLLING THUNDER air operations during 1965 were relatively light and resulted in an ordnance expenditure of only about 200 tons of ordnance per week. As the campaign got under way and more targets were made available, up to 1,600 tons of ordnance were dropped each week with the major portion against industrial targets. Damage within the industrial sector was quite evenly distributed among all target systems. For example, an estimated 27 percent of North Vietnam's electrical capacity was destroyed by the end of 1965.

Damage to military targets was concentrated primarily against military barracks. However, attacks against other military facilities such as am-

munition dumps and storage depots would have had more immediate impact since loss of military equipment required replacement from either the USSR or Communist China. By the end of 1965, approximately 1,500 waterborne logistic craft, 800 trucks, and 650 pieces of railroad rolling stock had been either damaged or destroyed as a result of offensive air action.

Indications were that enemy morale and tenacity were supported by a strong conviction that the patience of the American public would expire before we could attain a just peace. Hanoi officials stated publicly that enormous costs and casualties would persuade the United States to negotiate on North Vietnamese terms. In the eyes of a military commander, the objectives of the ROLLING THUNDER campaign had not been achieved—and to achieve them required adherence to the basic concept and principle of applying a continual and steadily increasing level of pressure.

ROLLING THUNDER OPERATIONS—1966

As 1966 opened, North Vietnam's airspace was free of United States combat air operations. The suspension which began on Christmas of 1965 in connection with our peace overtures was continued until 31 January 1966 when, all peace efforts having been spurned by the enemy, limited ROLLING THUNDER strikes and armed reconnaissance operations were resumed.

During the pause, enemy forces were deeply involved in actions preparing for the resumption of our operations. Our side, aware of this, made photographic reconnaissance and analyzed the information obtained. The enemy preparatory activity involved reconstructing and improving his lines of communication (LOC), improving and increasing the air defense of important areas, dispersing the military support base, and pushing a large number of trucks and supplies towards the infiltration corridors leading into Laos. Some 40 additional air defense positions were added in the vicinity of the northwest rail line between Hanoi and Communist China. Similarly, an increase of 26 guns protecting the LOC's below Vinh was noted.

The reconnaissance photography accomplished during the pause in our air attacks was of great value in determining enemy activity and was of material aid in planning future strikes. Analysis of the enemy effort expended to rehabilitate certain LOC's indicated the value he assigned to the various routes.

RESUMPTION OF ROLLING THUNDER OPERATIONS

Resumption of ROLLING THUNDER operations, which took place on 31 January, apparently came as no surprise to the North Vietnamese because the LOC associated activity resumed "normal" night time and dispersal procedures several days prior to this date. News media speculation and political and other developments presaged that the period of relative quiet was about to end.

On 12 January during the stand-down of offensive air operations against North Vietnam, a detailed discussion of the relationship of military operations in North Vietnam to the overall strategy of the war in South Vietnam was submitted to the Joint Chiefs of Staff. In this submission, CINCPAC noted that plans should be made to resume effective operations against North Vietnam if negotiations did not bring an early cease-fire. The relationship of military operations against North Vietnam to the overall strategy was discussed in terms of the following undertakings: (1) to deny to the Communists in South Vietnam the effective North Vietnamese direction and assistance vital to their war-making capability; (2) to assist the government of South Vietnam in protecting the South Vietnamese people from Communist subversion and oppression, to liberate areas dominated by the Viet Cong, and to assist in the establishment of a stable economy and the continuation of an independent non-Communist government; (3) to defeat the Viet Cong and North Vietnamese forces and destroy their base areas in South Vietnam.

We stated that it was necessary to achieve success in each of these three elements of strategy through simultaneous application of appropriate military force.

The first undertaking—to deny the Communists in South Vietnam effective North Vietnamese direction and assistance—was advocated as the basis for the renewed air campaign. The air campaign was to be conducted so as to accomplish this under-

taking most effectively. Access to external assistance that permitted North Vietnam to sustain military operations must be denied and the resources already in North Vietnam and most needed to support aggression would be destroyed. All known military material and facilities would be destroyed and military activities and movements would be continuously harassed and disrupted. The foregoing would require operations quite different from those before the cease-fire.

While recognizing limited achievements in the air campaign, CINCPAC's view was that the nature of the war had changed since the air campaign began. ROLLING THUNDER had not forced Hanoi to the decision sought, and indications were that Ho Chi Minh intended to continue to support the Viet Cong until he was denied the capability to do so.

In summary, we felt that these three tasks, effectively accomplished, would either bring the enemy to the conference table or cause the insurgency to wither from lack of support. The alternative appeared to be a long and costly war—costly in lives and material resources.

EXPANSION OF ROLLING THUNDER OPERATIONS

ROLLING THUNDER 48 extended from 31 January to the end of February 1966. Weather was a limiting factor throughout the period. It caused a high percentage of cancellations or diversions and greatly limited the information obtained from bomb damage assessment.

Most ROLLING THUNDER operations during this period were limited to the southern area of North Vietnam and by the end of the month there was little to report in the way of results.

By the end of February the results obtained through ROLLING THUNDER, while showing that considerable enemy military material and facilities were destroyed or damaged, gave very little evidence of progress toward the objective of the program.

March weather was slightly better than February's, with an occasional day of good visibility throughout the ROLLING THUNDER area. More often, however, pilots found 100 percent cloud cover or haze to 12,000 or 14,000 feet. This caused a high rate of cancellations. Even so, the rate of damage to fleeting targets in the ROLLING THUNDER area improved significantly.

In March General Westmoreland urgently requested authority to bring military power to bear on the enemy approaches to the battlefield for which he was responsible. On 1 April the Basic Operation Order for ROLLING THUNDER assigned General Westmoreland the primary responsibility for armed reconnaissance and intelligence analysis in the southernmost portion of North Vietnam. To remove any doubt about where the emphasis might lie, Secretary of Defense McNamara stated on 16 April that operations north of this southernmost portion of North Vietnam would be conducted only when they could be performed without penalty to required operations in the "extended battlefield."

ROLLING THUNDER 50, effective 1 April, directed planning and preparation for attacks against the most significant targets yet considered, including the Viet Tri Railroad-Highway Bridge; the Haiphong Thermal Power Plant; the Haiphong Cement Plant; and petroleum, oil, and lubricants (POL) storage at Haiphong, Hanoi, Nguyen Ke, Bac Giang, Do Son, and Duong Nham. Another important target was the early warning-ground control intercept radar at Kep, a facility that supported the area's air defense. Authority to strike these targets was to be granted separately by the Joint Chiefs of Staff. In late April, however, ROLLING THUNDER 50 was indefinitely extended and at that time the strikes on the ten significant targets had not been authorized.

The ten fixed targets specified by ROLLING THUNDER 50 remained on the restricted list through early June, when an 11th target—Phuc Yen POL Storage—was added. Soon thereafter, an intensive search began for techniques that would

minimize civilian casualties during strikes on POL storage at Haiphong and Hanoi and at the Haiphong Thermal Power and Cement Plants.

Then on 23 June CINCPAC received the authority to conduct air strikes, after first light on 24 June, on seven POL storage facilities and the Kep radar. It was specifically directed that same-day strikes against the POL facilities at Hanoi and Haiphong would initiate ROLLING THUNDER 50 ALPHA. Special care was to be taken to avoid damaging merchant shipping when attacking the Haiphong target. Steps were taken to minimize casualties among enemy civilians and the friendly operating forces. Special measures were devised to assure a rapid flow of detailed information to Washington.

Despite special precautions to insure the security of information pertaining to these operations, news media carried essential strike details at almost the same time the POL strikes were authorized. This prompted a postponement of the strikes, deferring damage to one of North Vietnam's basic resources for maintaining the military effort.

Shortly after noon on 30 June the program against POL facilities was launched with strikes on stores at Hanoi and Haiphong. About 95 percent damage was achieved by the Hanoi strike and an almost equal level was obtained after a second strike at Haiphong.

The POL system of North Vietnam was to be the primary target of ROLLING THUNDER 51. CINCPAC therefore promulgated a plan of action in late July to accomplish the maximum feasible POL system destruction while yet assuring a balanced effort against other North Vietnamese elements and their military capability to support the Viet Cong. However, the only fixed targets authorized by the Joint Chiefs of Staff for ROLLING THUNDER 51 were bridges.

On 12 November ROLLING THUNDER 52 was authorized, but armed reconnaissance objectives and operating areas remained the same as authorized in ROLLING THUNDER 51. The level of attack sorties per month was raised from 10,100 to 13,200. Strikes were authorized against one bridge, one railroad classification yard, two POL facilities, three surface-to-air missile storage areas, one vehicle depot, one cement plant, two power plants, and selected elements of the only steel plant in North Vietnam. However, the steel and cement plants and the two power plants were deferred from attack. On 15 December restrikes against the railroad classification yard and the vehicle depot were prohibited and by 23 December the delivery of ordnance within ten nautical miles of Hanoi had been prohibited.

In a message to the Joint Chiefs of Staff on 24 December CINCPAC recommended that authority to strike all ROLLING THUNDER targets be reinstituted. However, it was not until ROLLING THUNDER 55 and 56 in April and May of 1967 that some of these targets were reauthorized.

EFFECTS OF THE POL CAMPAIGN

By early 1965 North Vietnam, largely due to external assistance, possessed a good regional system of petroleum distribution facilities to meet the needs of industrial, transport, and military POL consumers. Nearly all of North Vietnam's POL storage capacity clustered around these centers of activity.

By June 1966 the air campaign had eliminated Nam Dinh and Phu Qui as centers of POL tank storage and had reduced Vinh to at most one-third of its original capacity. At the end of the month POL targets in Hanoi and Haiphong first came under attack. By early August these attacks had destroyed the largest storage facility in the Hanoi area and had lowered the capability of the Haiphong receiving terminal to marginal levels. Originally capable of storage of the equivalent of about four Soviet tanker loads, the Haiphong terminal could no longer hold more than one-third of a normal tanker's capacity.

As early as mid-1965 North Vietnam had begun taking remedial or precautionary measures against the air campaign. New farms of buried or bunkered tanks started dotting the country, the major-

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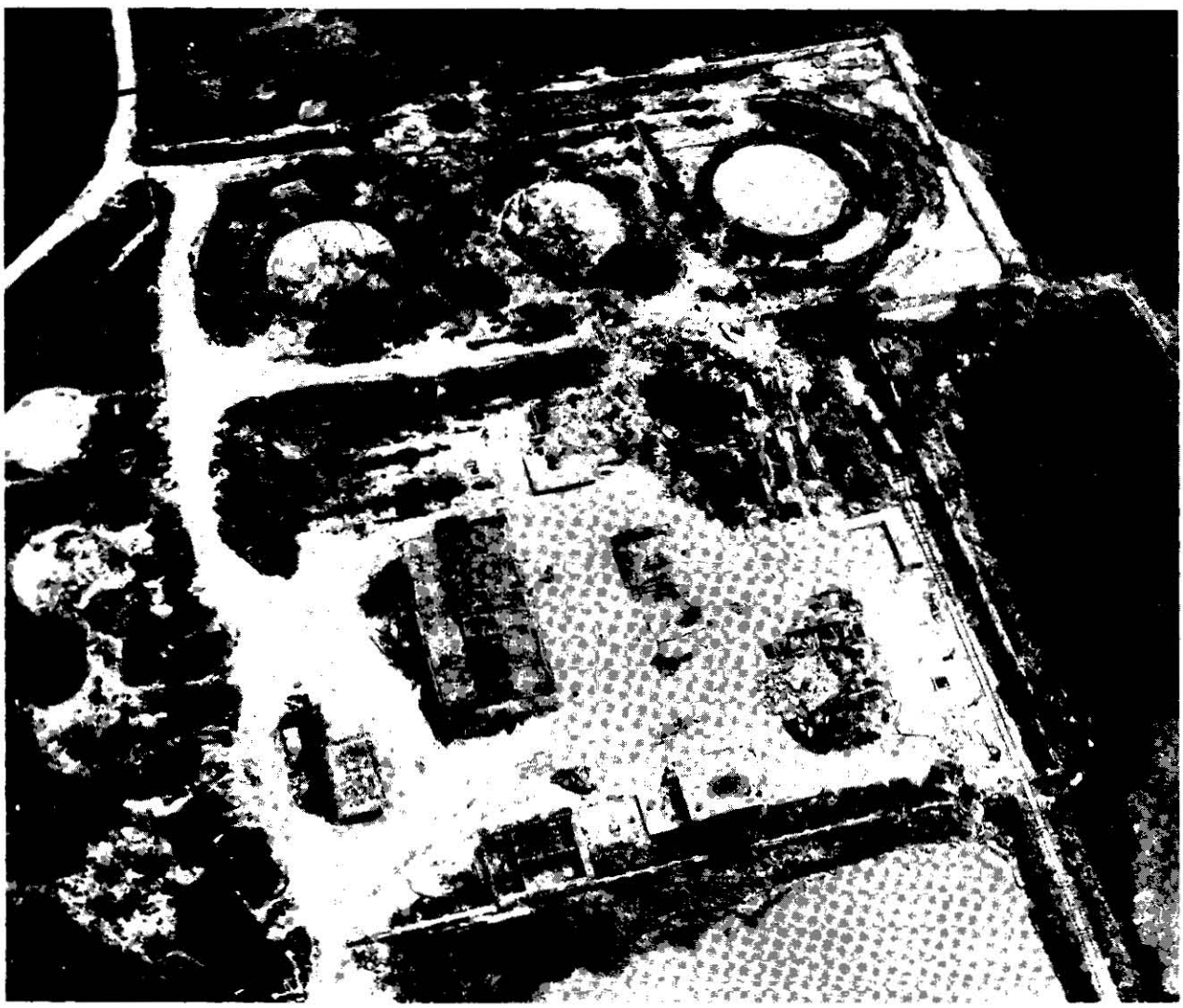
ity of them in or near the major military and industrial centers. Extremely large numbers of petroleum drums appeared. None of the POL farms approached pre-strike capacities. Characteristically, they consisted of varying numbers of tanks in the 2,200 to 3,300 gallon class, suggesting a possible modular relationship with Soviet-built tank trucks.

At Haiphong, tankers continued to arrive and discharge their cargo into lighters and barges that made deliveries to inland transhipment points and south along the coast. North Vietnam's 1968 POL receipt and distribution system continues to follow this pattern.

NORTH VIETNAM'S AIR DEFENSE SYSTEM—1966

Throughout 1966 the proliferation of SAM sites continued, and continuous SAM coverage extended from Yen Bai to Haiphong in the north to about Ha Tinh in the south. Additional SAM sites were discovered during the year, raising the total to about 150. As our strike operations expanded in North Vietnam the missile expenditure rate increased. Observed expenditures in 1966 totaled almost nine times the number of SAM's expended in 1965 and the effectiveness statistically of the SAM defenses dropped to an average of about 33 missiles



Nam Dinh Petroleum Storage

required per aircraft shot down. Our evasion tactics and electronics countermeasures degraded North Vietnam's efforts to maintain or improve SAM effectiveness.

During 1966 MIG aggressiveness against our strike forces increased from an average of only one engagement per month in the first half of the year to an average of about 12 per month during the last half. Interference by MIG's on numerous occasions served to force strike aircraft to jettison their ordnance in order to engage the attacking MIG's, or to evacuate the area. An increasingly effective air defense effort was evident as coordination between fighters, SAM's, antiaircraft artillery, and radar elements improved. In air encounters, we had a decided advantage with a total of 11 of our aircraft downed by MIG's compared to 29 MIG's lost to our fighters. By the end of 1966 some 70 fighter aircraft were in North Vietnam, including about 15 MIG-21's.

During 1966 the improvement of existing airfields and construction of new airfields maintained pace with other defense efforts. Phuc Yen and Kep remained the primary military airfields where the majority of the aircraft were deployed. Gia Lam at Hanoi and Cat Bi and Kien An at Haiphong were utilized as prime dispersal areas to provide for flexibility in the deployment of fighters to protect key areas. In January a new potential jet airfield at Yen Bai, about 60 miles northwest of Hanoi, was observed under construction which continued throughout the year. Harassing attacks against this field commenced in July and retarded construction efforts. In March Bai Thuong, 60 miles south of Hanoi, became almost operational, but our bombing attacks prevented it from becoming serviceable. Another new, potential jet airfield at Hoa Lac, 20 miles west of Hanoi, was observed under construction in June but was not operational during the remainder of the year.

The total number of radar sites at the end of 1966 numbered over 100, consisting of a well-balanced inventory of early warning, GCI, AAA fire control, and SAM-associated equipment.

HOLIDAY CEASE-FIRES

In anticipation of probable proposals for Christmas 1966 and the New Year and *Tet* (the Vietnamese New Year) cease-fires, CINCPAC presented his views well in advance so they might be considered in arriving at any decision made concerning a stand-down. In so doing, CINCPAC cited the conclusive disadvantages and risks that had accrued to friendly forces as a result of the extended 1965–1966 Christmas and *Tet* stand-downs.

At that time the enemy had achieved an increase of about 400 weapons in his antiaircraft artillery inventory in North Vietnam, the addition of more than 15 early warning and fire control radars, and construction of nearly 30 additional surface-to-air missile sites. The flow of men and material through Laos toward South Vietnam had also continued unabated and in fact had accelerated during the first three months of 1966. Large scale reconstruction of LOC's had been launched, key rail lines were repaired and traffic was resumed, and other measures taken to overcome the shortcomings and deficiencies caused by air attacks had increased the southward flow of men and material. In South Vietnam, the Viet Cong had initiated countrywide activity to position forces for the subsequent January–February 1966 campaign. And finally, the Viet Cong initiated 84 significant incidents during the 30-hour *Tet* stand-down.

Another Christmas-*Tet* stand-down would almost certainly result in a repeat performance by the enemy. While a stand-down of not more than 48 hours was militarily acceptable, CINCPAC felt there must be an unqualified understanding that it would not be unilaterally prolonged unless, of course, there was some indication that Hanoi was serious about negotiations. Commanders would need to be instructed and permitted to take all measures necessary, including increasing air reconnaissance (other than armed reconnaissance) and continuing activity away from their bases, to detect threatening enemy movements and concen-

trations. Friendly commanders would need to be allowed to retain contact until attacking North Vietnamese or Viet Cong forces withdrew and to resume offensive operations if necessary to provide for the safety of friendly forces. The risk of a stand-down of more than one or two days would serve only to the enemy's advantage and generate risks that we could not accept for our forces.

When the cease-fire for Christmas was directed, it provided for a stand-down in Vietnam from 24 to 26 December.

During the cease-fire period the enemy committed 101 violations. Total casualties for United States forces were three killed and 27 wounded; for South Vietnamese forces, 27 killed and 27 wounded; three civilians were killed and five wounded; and the Viet Cong-North Vietnamese had 26 killed and an unknown number wounded.

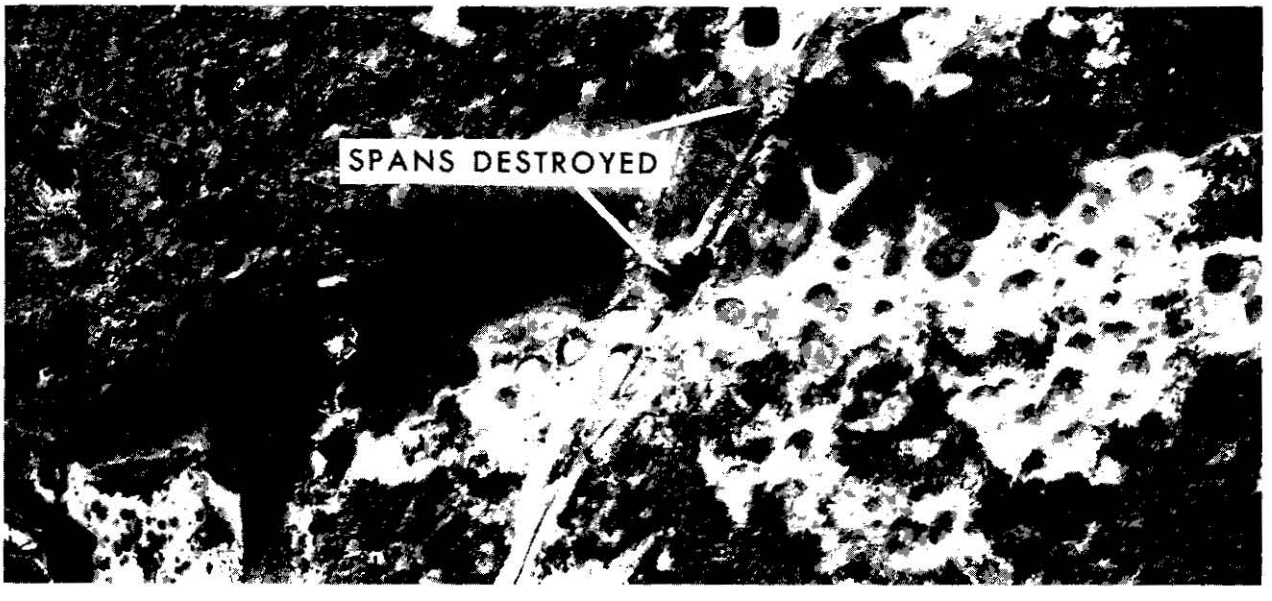
Along the coastal areas of North Vietnam, waterborne traffic increased substantially during the cease-fire period. Over 1,000 watercraft were sighted along the coast moving between the mouths of the Song Giang and Kien Giang (rivers) between 8 and 12 February 1967 (*Tet*). Of these, more than 15 were large steel-hulled cargo carriers, trawlers, or gunboats up to 140 feet long.

SEVENTH AIR FORCE ESTABLISHED

The bulk of our Air Force support in Southeast Asia had been provided by the 2d Air Division with headquarters in Saigon. With the continued expansion of 2d Air Division forces and activities, the Air Force Chief of Staff, General J. P. McConnell, determined that it would be appropriate to change the unit's title to Seventh Air Force. The change was made effective 1 April 1966 with 2d Air Division Commander Lieutenant General Joseph H. Moore, USAF, assuming command of the Seventh Air Force, with no alteration in existing command relationships.

EFFECTS DURING 1966

The existence of restricted areas around Hanoi and Haiphong and along the border of Communist China effectively insulated a large portion of industrial, military supply, and LOC targets from air attack. As a result, strikes were conducted against less significant targets generally consisting of transportation equipment, general military targets, and installations of the transportation system. This emphasis against transportation, combined with United States restraint, permitted the enemy to develop alternates and to overcome many



La Khe Thon railroad bridge.

NORTH VIETNAM
TARGET ELEMENT SUMMARY
1966

TARGET CATEGORY	DESTROYED	DAMAGED	TOTAL DESTROYED & DAMAGED
AAA/AW SITES	493	479	972
SAM SITES	18	83	101
COMMUNICATIONS SITES	38	57	95
MILITARY AREAS	118	434	552
POL AREAS	3,903	578	4,481
STAGING/SUPPLY AREAS	76	1,065	1,141
BUILDINGS	4,941	3,363	8,304
LOC's	1,359	6,390	7,749
PORTS	24	98	122
POWER PLANTS	0	6	6
RAILROAD YARDS	10	119	129
MOTOR VEHICLES	2,067	2,017	4,084
RAILROAD VEHICLES	1,095	1,219	2,314
WATER VEHICLES	3,690	5,810	9,500
TOTAL	17,832	21,718	39,550

NOTE: SOME FIXED TARGETS WERE RESTRUCK NUMEROUS TIMES AND DAMAGE TO THEM MAY BE REPORTED ABOVE MORE THAN ONCE.

of his difficulties as they arose. The construction of alternate routes for infiltration; the use of shuttle services, ferries, floating bridges, and bypasses; and the employment of large numbers of road and bridge repair and construction labor crews permitted continued operation of most LOC's to support insurgency in the South. Equipment losses, especially truck losses, were generally compensated for by increased imports from Communist countries.

Authorization to strike POL facilities and distribution systems was obtained in mid-1966. Initial efforts at destroying storage sites were fairly successful but dispersal of these facilities, which was accomplished shortly after the December 1965 bombing pause, made finding the sites much more difficult. By the end of September and despite the heavy emphasis on this campaign, it was estimated that at the normal rate of consumption, North Vietnam retained sufficient reserves of POL to maintain its military and economic activity for up to four months.

By the end of 1966 approximately 9,500 waterborne logistic craft, nearly 4,100 trucks, and over 2,000 pieces of railroad rolling stock had been either damaged or destroyed as a result of air attacks.

Despite the fact that the enemy was able to compensate for a large portion of the damage suffered by his transportation system and industrial capability, the air offensive accomplished several tasks which, if left undone, would have resulted in an increased ground threat to South Vietnam. The combination of the air offensive against POL facilities and the transportation system increased the pressure to maintain adequate stocks, required increased imports, and added to port congestion in Haiphong. Constant harassment of the LOC's prevented uninhibited movement of military units to the south and caused them to move primarily at night, appreciably extending their transit time. Added to the disruption of the North Vietnamese timetable for operations in South Vietnam, these efforts brought about economic deterioration, disrupted normal transportation and logistic networks, and aggravated management problems and manpower shortages.

After a comprehensive review of ROLLING THUNDER operations, which included its objectives, results, and future courses of action, CINCPAC concluded that the basic objectives and tasks that had been set forth for ROLLING THUNDER were still valid and that an effective ROLLING THUNDER air campaign, together with continued successful operations in South Vietnam, offered the greatest prospects for bringing the war to a successful conclusion on terms advantageous to the United States and its allies.

ROLLING THUNDER OPERATIONS—1967

On 12 January 1967 General Earle G. Wheeler, Chairman of the Joint Chiefs of Staff, was briefed on the CINCPAC concept for conducting ROLLING THUNDER operations in 1967. The objective was to bring increasing pressure so as to cause North Vietnam to cease supporting, controlling, and directing insurgencies in Southeast Asia. Tasks to accomplish this objective were three: to deny North Vietnam access to the flow of external assistance, to curtail the flow of men and supplies from North Vietnam into Laos and South Vietnam, and to destroy in depth those resources in North Vietnam that contributed to support of the aggression.

These tasks were considered interdependent and, in a broad sense, represented a three-pronged approach that required an integrated targeting concept.

CINCPAC felt that accomplishment of these tasks was dependent on the application of continuous and steadily increasing pressures. The application of steadily increasing pressure was denied us in 1966 through operational restrictions and as a result the tasks were not accomplished. CINCPAC also felt that the best way to increase the pressure was to apply continuing steady power, on a long term targeting basis, against key target systems.

The CINCPAC concept for a long term targeting program emphasized target systems, rather than individual sites, and stressed weight of effort on a continuing basis. Since a majority of the targets was in the northern area of North Vietnam, the concept focused primarily on that area. There were six basic target systems: electric power, war supporting industry, transportation support facilities, military complexes, petroleum storage, and air defense.

On 18 January CINCPAC outlined the targeting and operational concept to the Joint Chiefs of Staff. CINCPAC recommended the following parameter in implementing the program against the six basic target systems—all targets in each of the target systems that required approval by higher authority should be approved as a package. This would allow maximum flexibility in the timing of strikes, taking into consideration intelligence and weather factors. Continuing pressure should be assured by striking about 15 new targets each month. The objective would be to avoid peaks and depressions. If we were to increase the pressure on Hanoi, a steady program of disruption against the basic target systems was necessary. The six target systems should be considered as a single package, with each system interrelated to the other, and elements of each system should be attacked, rather than one system at a time.

A breakdown by system of those targets proposed for strike under the concept was furnished to the Joint Chiefs of Staff with the comment that the concept had "finite limits" and "finite goals" and therefore could not be considered as "open ended." Of necessity the program was dynamic. Some targets would probably require periodic restrike, others would not. New targets would probably be generated as the enemy adjusted. When major targets were destroyed or disrupted, minor targets which had not originally been considered worth hitting would become of primary significance.

The ROLLING THUNDER campaign during the first quarter of 1967 was hampered by adverse weather typical of the northeast monsoon season, conditions which precluded full-scale attacks on fixed targets and greatly reduced armed reconnaissance. However, ground controlled radar de-

livery of ordnance in the southern Route Packages, small force attacks by Seventh Fleet A–6 aircraft, and attacks by Seventh Air Force F–105's and F–4's combined to keep pressure around-the-clock.

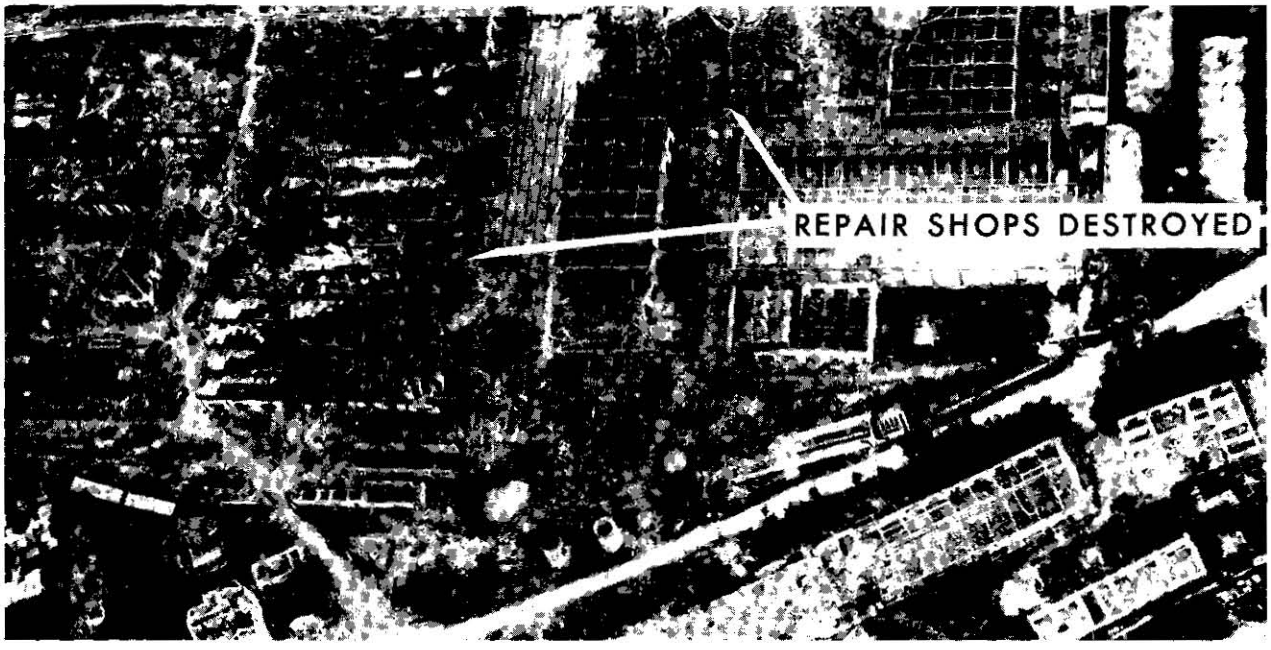
Of special importance was the implementation of ROLLING THUNDER 53 on 24 January and ROLLING THUNDER 54 on 23 February. Combined, they authorized strikes against 16 fixed targets in the vital industrial area in the northeast quadrant of North Vietnam.

The middle of April generally marked the end of the bad weather over North Vietnam, air activity was accelerated, and by 21 April all ROLLING THUNDER 54 targets had been struck.

On 23 April the execute order for ROLLING THUNDER 55 was received. Armed reconnaissance operating areas remained constant while fixed targets included one power transformer station, a cement plant, three bridges, a rail repair shop, an ammunition depot, a POL storage area, and the Kep and Hoa Lac MIG-capable airfields in the vicinity of Hanoi. Selected targets were authorized for strike within the ten mile circle around Hanoi. By 28 April all but one of the ROLLING THUNDER 55 targets had been struck.

The continued strikes in the Hanoi-Haiphong area caused intensified defensive reactions to our strikes. The enemy rapidly shifted concentrations of antiaircraft artillery and surface-to-air missiles to those areas.

ROLLING THUNDER 55, was replaced by ROLLING THUNDER 56 on 2 May. This added ten new fixed targets, all of which were struck by the end of May. The good weather period over North Vietnam permitted maximum effort against all authorized targets and LOC's. Of signal interest was the concentrated program against North Vietnam's land transportation system along the major supply lines from Communist China. The main effort was concentrated primarily on classification yards, repair facilities, railroad and highway bridges, and support areas. Results were excellent, particularly in the entrapment of rolling stock and its subsequent destruction. Simultaneous armed reconnaissance of the road and canal LOC's contributed to intensifying overall logistical problems throughout North Vietnam. This pattern of air attacks continued throughout 1967 with the over-



Hanoi railroad car repair shops.

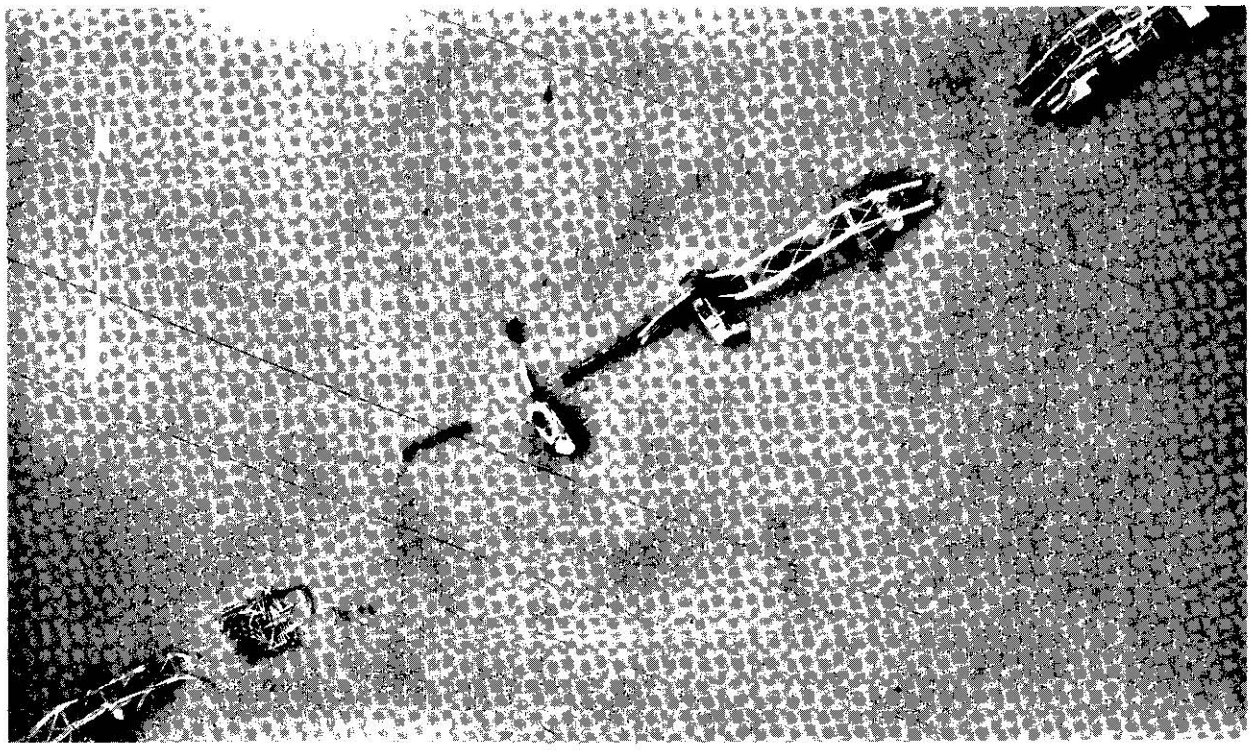
all purpose of isolating Haiphong from Hanoi, and Hanoi and Haiphong from the rest of the country, especially those LOC's radiating southward to Laos and the Demilitarized Zone.

During July favorable weather existed in the northern areas of North Vietnam approximately 66 percent of the month. This allowed maximum effort to be applied throughout North Vietnam and resulted in a record number of attack sorties flown in the Hanoi and Haiphong areas and against the vital northern rail and road transportation system. On 20 July ROLLING THUNDER 57, with 16 new targets, was authorized.

The period of favorable flying weather during August was about 20 percent less than in July. The campaign in the north was stimulated by the follow-on authorization to ROLLING THUNDER 57 for attacks against selected LOC in the northeast. The new authorization increased the number of fixed targets from 16 to 46. These strikes resulted in marked attrition of railroad rolling stock and interdiction of the railroad lines. In the Hanoi and Haiphong area, 30 fixed targets were attacked. The targets exposed in these previously restricted areas consisted primarily of railroad and highway bridges and bypasses, and supply storage areas. Penetration of these sanctuaries, coupled with the high level of damage attained, further compounded the problem of transhipment of vital supplies to the South. On 24 August all targets in the Hanoi area were again placed in a restricted status.

Weather in the northern sections of North Vietnam during September was much worse than forecast and severely hampered air operations. Seventeen new targets were added to the ROLLING THUNDER 57 target list during September; eight were in the Hanoi restricted area and adverse weather limited our effort against the remainder. Despite the degraded effort in the northern Route Packages, constant pressure was maintained through the employment of the all-weather bombing systems of Air Force and Navy aircraft.

Improved weather during October, the lifting of the restriction on authorized targets within the Hanoi area on 23 October, and the addition of eight new targets to the ROLLING THUNDER



Hanoi railroad and highway bridge over the Red River.

Above, U.S. aircraft experiences near miss by enemy surface-to-air missile. *Below,* a missile detonating harmlessly.

57 target list permitted a 60 percent increase in attack sorties against these targets as compared to the September effort. The eight additional targets included seven new targets in the immediate Haiphong area plus a ship repair facility near Haiphong. The transportation, power, and air defense systems were dealt severe blows as a result of the 23 October authority to re-enter the Hanoi area and to strike the new targets in and near Haiphong.

During November 14 new targets were added to the ROLLING THUNDER 57 target list bringing it to a total of 85. Adverse weather throughout November precluded execution of the planned air effort in the northern areas. However, of the 85 targets, 25 were struck one or more times during the month.

Although no new targets were authorized during December and the damage level to the ROLLING THUNDER 57 targets remained relatively unchanged, strikes were conducted against previously authorized targets. Both the Doumer and Canal Des Rapides Railway and Highway Bridges at Hanoi were extensively damaged during the period 14 through 18 December. Other key targets struck included the Hai Duong, Haiphong, and Kien An Highway and Railroad Bridges and the Kien An, Yen Bai, Hoa Loc, Kep, and Phuc Yen Airfields. All were unserviceable for varying lengths of time. Weather continued to be the dominant factor influencing ROLLING THUNDER operations throughout North Vietnam during December. The poor weather conditions signified the true beginning of the northeast monsoon which would curtail air operations over North Vietnam for the next three or four months.

NORTH VIETNAM'S AIR DEFENSE SYSTEM—1967

Although MIG pilot aggressiveness, proficiency, and air tactics continued to improve in 1967, we maintained the lead in air engagements. Averaging some 20 encounters per month for the year, the North Vietnamese Air Force lost aircraft at a ratio of three to one (over 75 MIG's downed in air-to-air combat vs 25 of our aircraft). In addition to the air losses, strikes against three airfields resulted in the destruction of 15 MIG's on the ground. MIG losses, however, were soon replaced by shipments from the USSR and Communist China. At year's end, some 20 aircraft were operating in North Vietnam; the remainder were believed to be in southern China, probably for retraining and regrouping.

At the beginning of 1967 North Vietnam's fighter aircraft were utilizing four airfields: Gia Lam, Phuc Yen, Kep, and Cat Bi. In February newly constructed Hoa Lac Airfield became serviceable and in April our photography indicated that MIG aircraft had landed there. Harassing strikes against Hoa Lac and Kep began in April and Kien An at Haiphong was added to the list in May. By the end of the year, all of the jet-capable or jet-potential airfields had been attacked except for Gia Lam, the international airport at Hanoi, which had not been authorized for strike. Although vital ground equipment was destroyed, most of the major fields were returned to serviceability within a short time after each strike.

By 1967 approximately 25 SAM battalions were estimated to be operational in North Vietnam and by the end of the year more than 100 new SAM sites had been discovered. SAM coverage expanded to the northwest and to the area just north of the Demilitarized Zone. In October 1967 and again in December, the first known SAM's were fired at B–52 aircraft, but they failed to damage the aircraft. Although some 3,500 SAM visual firings were noted throughout 1967, compared to about 990 in 1966, SAM effectiveness again declined. An average of 55 SAM's was required to down one of our aircraft compared to 33 in 1966 and 13 in 1965. It was evident that our countermeasures and techniques were becoming more effective.

MINING OF NORTH VIETNAM WATERS

During 1966 the North Vietnamese made increased use of waterborne logistic craft to transport

men and supplies southward. On 23 February 1967 the mining of selected areas of North Vietnam was authorized by higher authority. The use of air-delivered bottom-laid mines in selected river areas was determined to be an effective method of assisting in reduction of North Vietnamese coastal traffic.

Operations began in March, with all mines sown in the mouths of rivers. Haiphong, Hon Gai, and Cam Pha deepwater ports were not authorized for mining.

While the extent of the effectiveness of the mining operations has been impossible to document because of a lack of concrete intelligence and our inability to maintain near-constant surveillance, the slowdown in logistic traffic in these areas indicates that the operations had a significant impact on enemy activity.

TAKING THE WAR TO THE ENEMY IN NORTH VIETNAM—1967

In reporting the achievement of our objective in 1967, the three basic tasks we had set for ourselves provide the best means for discussing results.

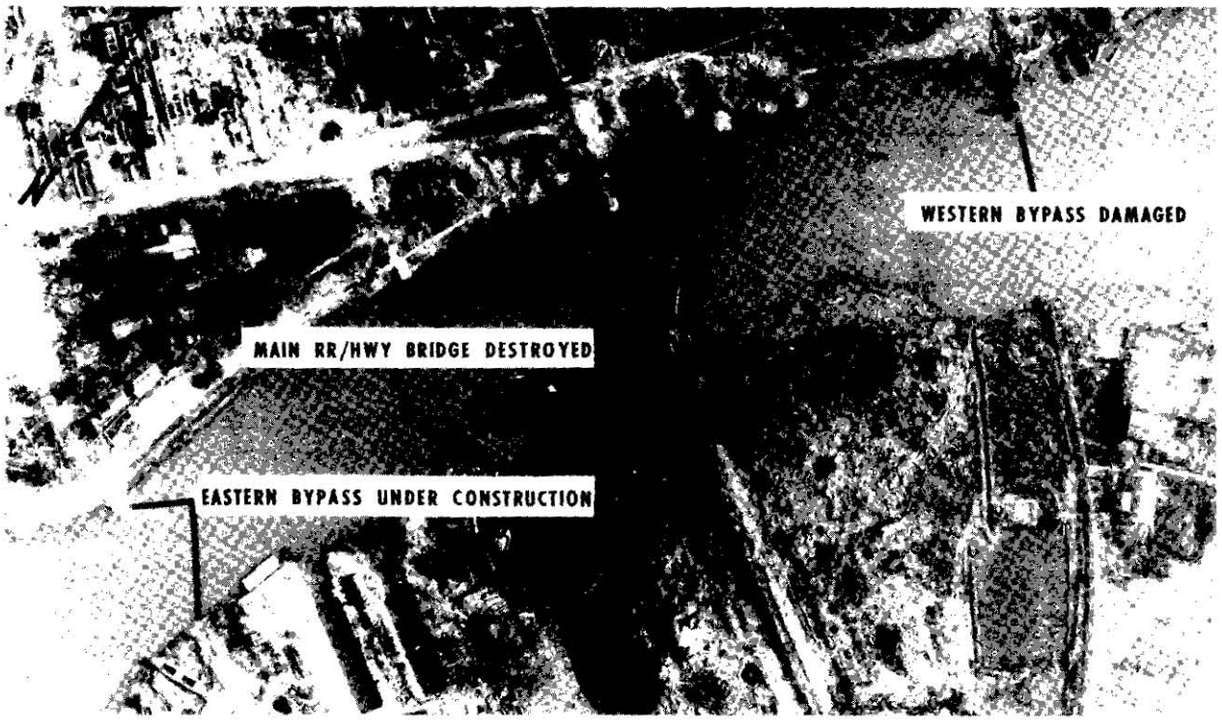
Denying Access to External Assistance

The amount of external assistance to North Vietnam had increased every year since the war began and with it the tonnage of goods imported into the country. In 1967 sea import tonnages were almost 40 percent greater than the 930,000 metric tons delivered in 1966. Mining and air strikes against port facilities had not been authorized where third country shipping could be endangered. However, systematic strikes on LOC's greatly impeded the flow of imported goods once they were within the country. These sorties included attacks against war-supporting fixed targets as well as key LOC targets to reduce the flow of imported material.

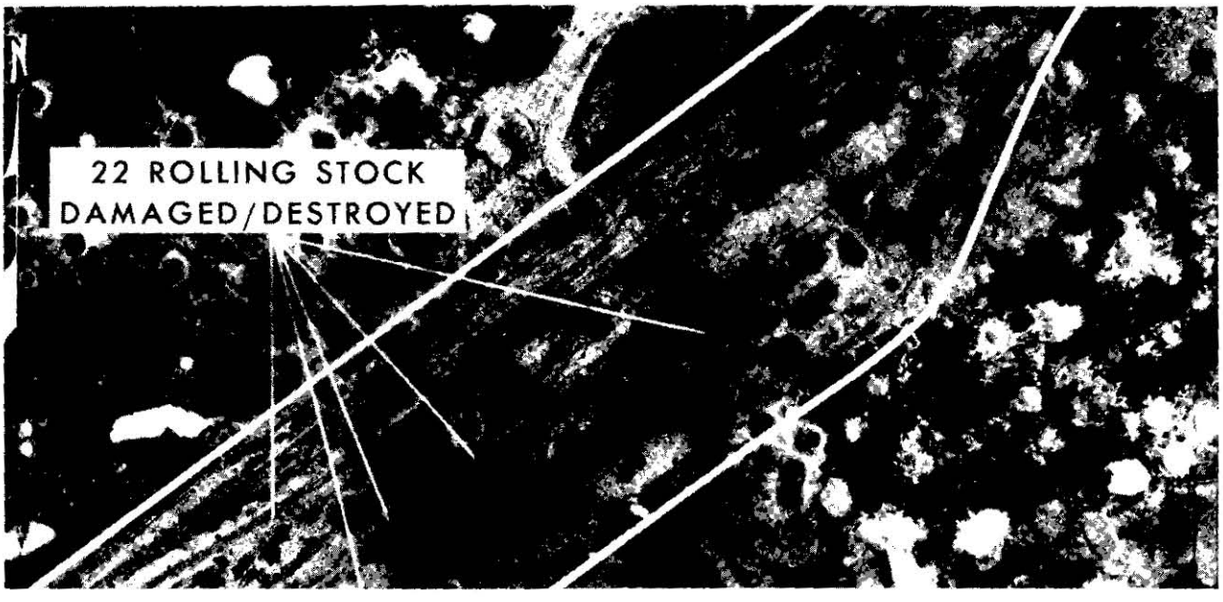
The advent of good weather in late May 1967 permitted a concentrated strike effort against all of the northern rail lines and within the Hanoi and Haiphong complexes. Strikes in June, July, and August accounted for over 56 percent of the total trucks and rail rolling stock reported as damaged and destroyed for the entire year. A mid-year estimate indicated that approximately 30 percent of imported material was being destroyed by air strikes while in transit. Strikes against large military storage depots in the Hanoi and the Thai Nguyen areas destroyed additional supplies which had arrived in North Vietnam by rail and sea.

Beginning in August, a major campaign was launched to isolate Hanoi and Haiphong from each other and from the northern and southern logistic routes. The campaign rendered the main bridges in these areas unserviceable for varying lengths of time, thus making it more difficult for North Vietnam to move imports through these major distribution centers. Numerous bypasses were put into operation and both truck and watercraft activity increased, denoting North Vietnam's attempts to overcome the bombing effects. Transportation clearance capacity was considerably reduced. Watercraft were noted mooring near foreign ships in order to lessen the chance of their being attacked. Large open storage areas multiplied near the Haiphong docks and throughout the city as the full weight of the campaign became evident. By October some 200,000 tons of goods imported by sea had been accumulated and stacked in these areas. In early November intelligence indicated that the many air alerts slowed up work on the Haiphong docks as workers took shelter. In addition, absenteeism among stevedores had increased because of the dangers of coming to work. Hunger and weariness among dock workers were reported. Shortages of trucks and specific types of lighters slowed down the off-loading of ships and the clearing of cargo from the port. Effective dredging of the approaches to Haiphong was reduced by the mere presence of United States aircraft in the area and foreign merchant ships were unable to take advantage of their full load capacity.

The overall effect of our effort to impede the flow of external assistance resulted not only in destruction and damage to the transportation systems and goods being transported but also created



Haiphong railroad bridge complex.



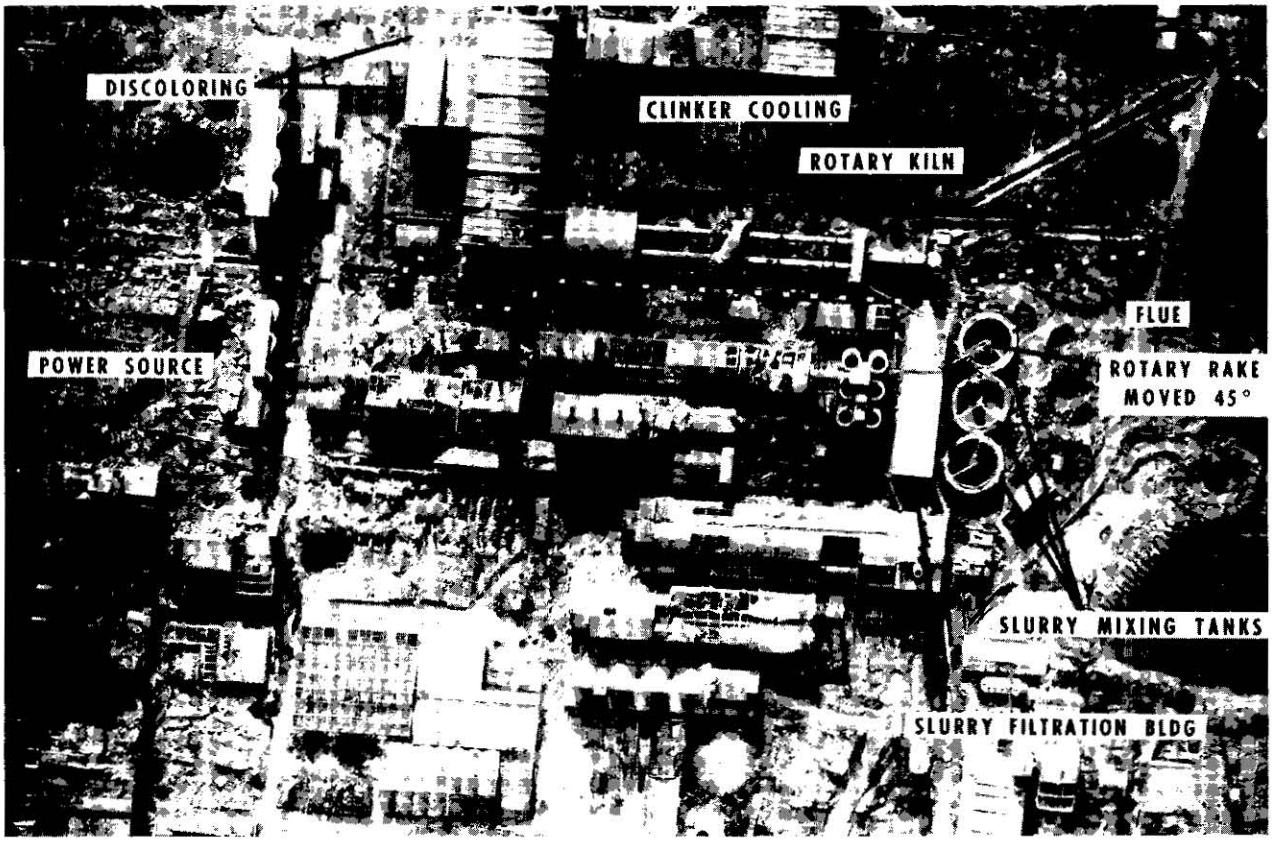
Kep Railroad Yard #2.

additional management, distribution, and manpower problems. The attacks caused a bottleneck at Haiphong where the inability to effectively move goods inland from the port resulted in congestion on the docks and a slowdown in unloading ships. By October road and rail interdictions had reduced the transportation clearance capacity at Haiphong to about 2,500 tons per day. An average of 4,000 tons per day of imports had arrived in Haiphong during the year.

Impeding Movement of Men and Material

Men and material needed for the level of combat prevailing in South Vietnam continued to flow despite our attacks on LOC's, but we made such movement increasingly costly. In the complementary naval gunfire program, our offensive operations involved 1,384 ship-days on station and contributed materially toward reducing enemy seaborne infiltration in southern North Vietnam and in the vicinity of the Demilitarized Zone.

During 1967 attacks against the North Vietnam transport system resulted in destruction of logistics carriers and their cargo as well as personnel casualties. Air attacks throughout North Vietnam destroyed or damaged over 5,260 motor vehicles, 2,500 pieces of railroad rolling stock, and 11,500 watercraft. Naval gunfire accounted for over 1,500 waterborne logistic craft destroyed or damaged. The enemy suffered additional material losses from destroyed rail lines, bridges, ferries, railroad yards and shops, storage areas, and truck parks. Some 3,700 land targets were struck by naval gunfire, including some 300 coastal defense and radar sites that were damaged or destroyed. Through assistance from other Communist countries the enemy was able to replace or rehabilitate many of the items damaged or destroyed, and logis-



Haiphong Cement Plant.

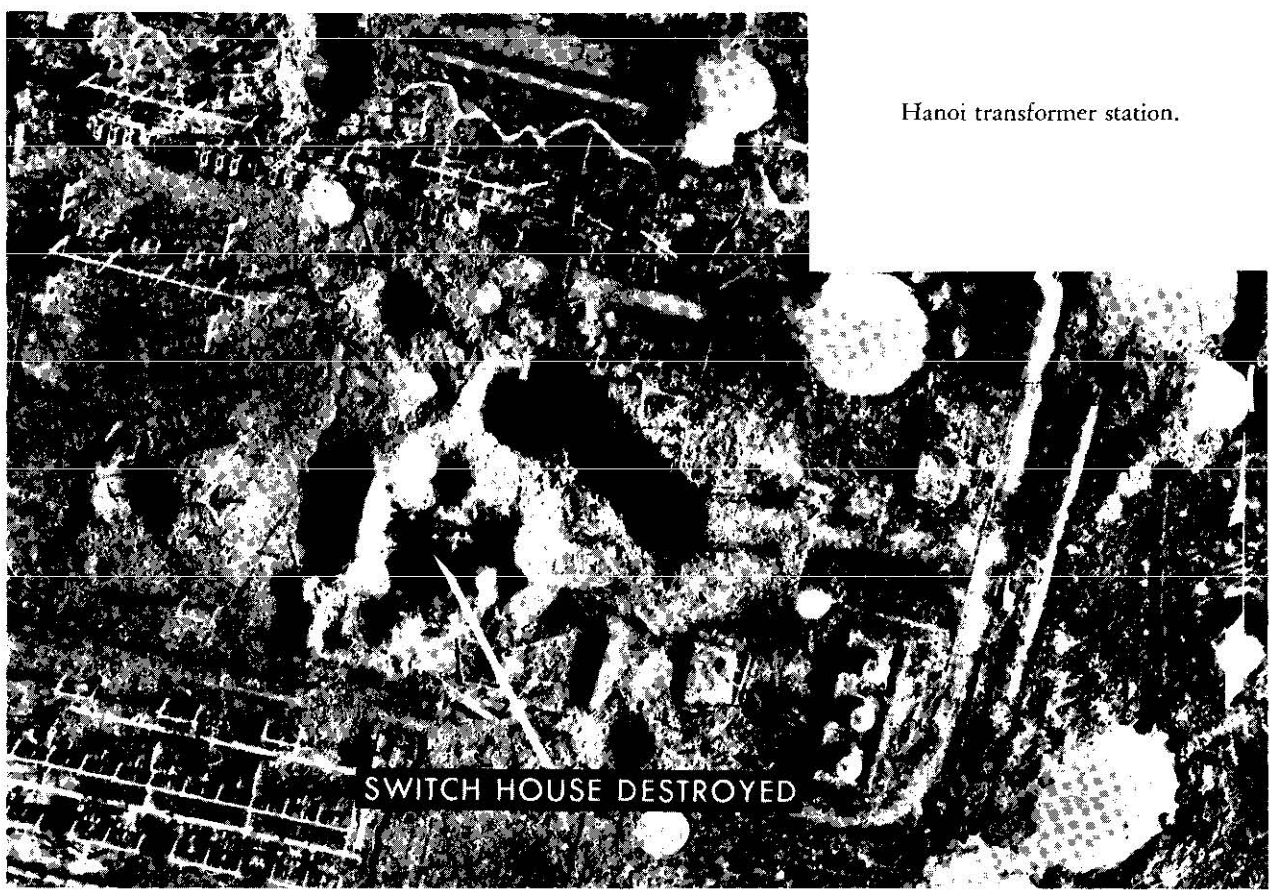
tics carrier inventories thus were roughly at the same level as they were at the beginning of the year. Nevertheless, construction problems and delays caused interruptions in the flow of men and supplies, caused a great loss of workhours, and restricted movement, particularly during daylight hours.

A major effect of our efforts to impede movement of the enemy was to force Hanoi to divert the efforts of 500,000 to 600,000 civilians to full-time and part-time war related activities, in particular for air defense and repair of the LOC's. This diverted manpower from other pursuits, particularly from agriculture. The estimated lower food production yields, coupled with an increase in food imports in 1967, indicated that agriculture had difficulty in adjusting to this smaller work force. (Imports in 1967 were some six times those of 1966, but an unusual drought was partly the reason.) The cost and difficulties of the war to Hanoi had sharply increased and only through the willingness of other Communist countries to provide maximum replacement of goods and material had North Vietnam managed to sustain its war effort.

Destroying in Depth the War-Making Resources in North Vietnam

Air attacks were authorized and executed by target systems for the first time in 1967, although the attacks were limited to specific targets within each system.

Strikes against authorized targets during the good weather period in 1967 resulted in damage to all target systems and decreased productivity. The Thai Nguyen iron and steel combine, which was North Vietnam's major plant located 30 miles north of Hanoi, and which had an estimated design production capacity of some 300,000 metric tons of pig iron annually, was first struck in the



Hanoi transformer station.

spring of 1967. By the end of June production of pig iron and coke had completely ceased as had the fabrication of bridge pontoons, barges, oil storage tanks, and other steel products utilized in supporting the war effort. The status of this industry when combined with the unserviceability of the Haiphong Cement Plant pointed to the drastically reduced North Vietnamese capabilities for construction and repair of LOC's. To compensate for these losses North Vietnam had to look to either the inefficient production of the many small shops of the handicraft industries or to additional imports from Communist China, the USSR, or the Eastern European countries. Either adjustment brought additional problems of distribution and management. The requirement for additional imports reduced shipping space normally allocated to other war supplies and added to the congestion at the ports as more ships were required to meet the added requirements.

Strikes against power plants in the crucial northeast area continued during the good weather period for 1967, including the Hanoi Thermal Power Plant which was struck for the first time in May. By mid-November some 85 percent of the North Vietnamese power system had been rendered unserviceable, affecting industrial, government, and consumer needs.

It is of vital importance, however, in viewing results achieved by ROLLING THUNDER operations during 1967, to bear in mind that the objective of applying continuing and steadily increasing pressure over an extended period of time was not attained. The objective was approached briefly during the summer months and it was during that period that the air campaign began to have its greatest impact—to make the pressure felt by the enemy. The pressure period was foreshortened, even as the enemy began to hurt.

HOLIDAY STAND-DOWNS

Prior to 1967 three cease-fires were observed in South Vietnam: Christmas 1965—30 hours; *Tet* 1966—over four days; and Christmas 1966—48 hours. Bombing of North Vietnam had been suspended for even longer periods. On 22 November 1966 the Joint Chiefs of Staff informed the Sec-

Haiphong Thermal Power Plant.

retary of Defense that they opposed any stand-downs in military operations during the holiday seasons. The Joint Chiefs of Staff indicated that if a cease-fire were directed, bombing stand-downs should be limited to a maximum of 48 hours in order to minimize the military advantages to the enemy, and that, if there was no indication of North Vietnam's willingness to negotiate, we should be allowed to strike unusual military targets in North Vietnam which might develop. This action by the Joint Chiefs of Staff supported CINCPAC's position on this matter.

During 1967 four stand-downs were observed: New Years—48 hours, *Tet*—over five days, Buddha's Birthday—24 hours, and Christmas—24 hours. As in the case of all previous stand-downs, those in 1967 were beneficial to the enemy. He took full advantage of the opportunity to conduct major resupply operations and to reconstitute and replenish his forces, all of which cost the United States and other Free World forces greater casualties.

Intensive photographic reconnaissance conducted over North Vietnam during the period of *Tet* in 1967, supplemented by visual sightings from ships and aircraft, revealed significant logistic movement of materiel by water, truck, and rail transport. As a result of this reconnaissance we estimated that North Vietnam moved between 22,300 and 25,100 tons of supplies from the north into the area below 19° North in the period 8 to 12 February.

Evidence indicated that the North Vietnamese had anticipated and calculated in their planning the probability of a bombing pause during *Tet* and took full advantage of the situation.

On Buddha's Birthday, 23 May 1967, another stand-down was observed. This time we were authorized to conduct both naval gunfire operations and air strikes against any observed substantial military resupply activity in North Vietnam south of 20° North.

No official United States position had been announced concerning a Christmas or New Year stand-down by 18 November 1967 when a Hanoi radio broadcast stated that the National Liberation Front was ordering a suspension of military attacks from 23 to 26 December 1967 for Christmas, from 29 December 1967 to 1 January 1968 for the New Year, and from 26 January to 2 February for *Tet*.

On 9 December the Joint Chiefs of Staff noted that the United States would be prepared to institute stand-downs of military activity for 24 hours at Christmas and New Years and 48 hours at *Tet*. They recommended to the Secretary of Defense a modification of the rules of engagement promulgated in 1966 to provide authority to counter major resupply and infiltration activities detected during the stand-down period.

On 15 December 1967 the South Vietnamese government announced a 24-hour Christmas stand-down for the Allied forces, which went into effect as announced.

On 30 December the South Vietnamese government announced that a New Year cease-fire would be in effect from 31 December 1967 to 2 January 1968. The cease-fire period included a 12-hour extension which the South Vietnamese government had added in response to the appeal made by Pope Paul VI to make 1 January 1968 a "day of peace." The same instructions governing military cease-fire activities at Christmas were observed during the New Year cease-fire.

Prior to the 24-hour Christmas and 36-hour New Year stand-downs there were many indications the enemy planned to take full advantage of these periods. Later events proved that he conducted a massive and well organized resupply of his forces. Pilot sightings and photographic coverage recorded over 3,000 trucks moving in the Panhandle area of North Vietnam during the two stand-downs, the great majority heading south. Almost 1,300 trucks were noted during Christmas and about 1,800 during the slightly longer New Year stand-down. This compared with a daily average of about 170 for the other days between 22 December 1967 and 4 January 1968. A minimum of about

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NORTH VIETNAM
TARGET ELEMENT SUMMARY
1967

TARGET CATEGORY	DESTROYED	DAMAGED	TOTAL DESTROYED & DAMAGED
AAA/AW SITES	450	1,479	1,929
SAM SITES	33	196	229
COMMUNICATIONS SITES	19	121	140
MILITARY AREAS	194	614	808
POL AREAS	2	130	132
STAGING/SUPPLY AREAS	27	1,545	1,572
BUILDINGS	2,354	1,193	3,547
LOC's	813	5,684	6,497
PORTS	13	75	88
POWER PLANTS	2	28	30
RAILROAD YARDS	3	176	179
MOTOR VEHICLES	2,929	2,658	5,587
RAILROAD VEHICLES	1,077	1,434	2,511
WATER VEHICLES	4,396	7,367	11,763
TOTAL	12,312	22,700	35,012

NOTE: SOME FIXED TARGETS WERE RESTRUCK NUMEROUS TIMES AND DAMAGE TO THEM MAY BE REPORTED ABOVE MORE THAN ONCE.

5,000 tons was moved by the enemy toward forces in the Demilitarized Zone and Laos. It should be noted that almost all of these sightings were during daylight. Poor weather undoubtedly precluded numerous additional sightings. The trucks sighted were almost ten times those sighted during the same holidays in 1966–67 when two 48-hour truces were observed. If these activities had been only for internal defense, there would have been little cause for concern. However, they were undertaken chiefly to support the external aggressive operations of North Vietnamese and Viet Cong troops against South Vietnam. The intent was purely hostile and aggressive.

ROLLING THUNDER OPERATIONS JANUARY THROUGH MARCH 1968

The effort in North Vietnam during the first three months of 1968 was drastically curtailed due to the northeast monsoon. During all three months, weather was worse than predicted. In the northern Route Packages there was an average of only three days per month on which visual strikes could be accomplished. The weather during February was the poorest experienced during any month since the beginning of ROLLING THUNDER.

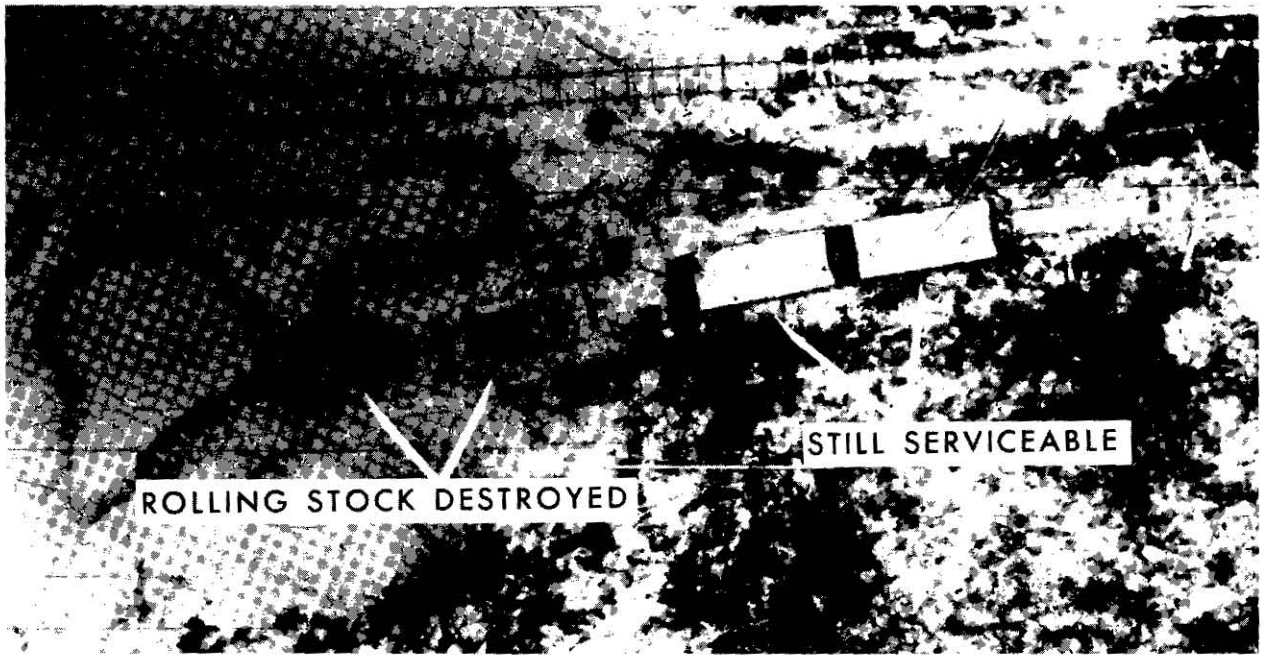
The damage level to the fixed targets in the northern sectors of North Vietnam remained relatively unchanged through the end of March. Nearly all strikes required the use of all-weather bombing techniques. Weather inhibited drastically our post-strike assessment and we were unable to evaluate the effectiveness of much of our effort.

ROLLING THUNDER 57 remained in effect through June 1968. Nine new targets were added to the basic target list during 1968; of these seven were attacked.

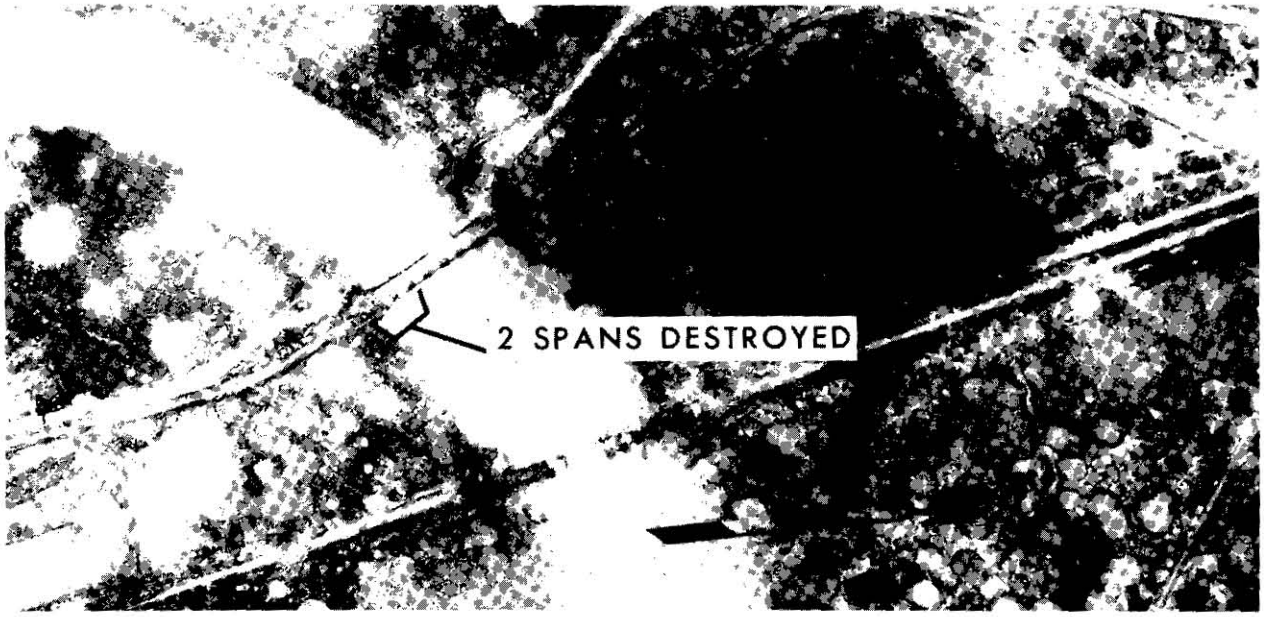
EFFECTS, JANUARY THROUGH MARCH

Bombing operations against North Vietnam continued into 1968 with the aim of isolating the port of Haiphong from the rest of the country to prevent the distribution within the country of material being imported. This concerted campaign against LOC's around Haiphong forced the North Vietnamese to adopt extraordinary efforts to maintain a flow of material over existing lines. Distribution problems for Hanoi were further aggravated by the arrival of a near-record number of foreign ships in Haiphong in January and again in March when over 40 ships arrived each month for off-loading. The port of Hon Gai was used in February as an off-loading point for a Soviet and a British ship, probably in an effort to reduce the pressure on Haiphong. This port normally served the nearby coal mining area and did not contribute significantly to the flow of imports into the country.

Expansion of the road transportation net continued as North Vietnam sought to gain greater flexibility by the addition of bypasses and the construction of entirely new road segments. Of particular significance was the new route being built to connect the Ning-Ming area of Communist China with the Haiphong-Cam Pha region of North Vietnam, a development which would add an estimated 1,000 metric tons per day capacity to the cross-border capability between the two countries. Repair efforts elsewhere in the country were vigorously pursued. The Paul Doumer Bridge located immediately north of Hanoi was the object of numerous air attacks and suffered heavy damage. Concurrent with construction activity at the Doumer Bridge, several bridge bypasses and ferry landings were built elsewhere along the banks of the Red River near the bridge, attesting to the importance of the route in the movement of material from Communist China and inland from Haiphong.



Rolling stock attrition on Railroad #7.



Tam Da Railroad Bypass #2.

NORTH VIETNAM
TARGET ELEMENT SUMMARY
1968

TARGET CATEGORY	DESTROYED	DAMAGED	TOTAL DESTROYED & DAMAGED
AAA/AW SITES	143	333	476
SAM SITES	14	76	90
COMMUNICATIONS SITES	18	70	88
MILITARY AREAS	25	142	167
POL AREAS	34	180	214
STAGING/SUPPLY AREAS	54	479	533
BUILDINGS	532	232	764
LOC's	199	2,533	2,732
PORTS	3	10	13
POWER PLANTS	1	5	6
RAILROAD YARDS	0	6	6
MOTOR VEHICLES	2,234	2,470	4,704
RAILROAD VEHICLES	139	209	348
WATER VEHICLES	1,200	1,515	2,715
TOTAL	4,596	8,260	12,856

NOTE: SOME FIXED TARGETS WERE RESTRUCK NUMEROUS TIMES AND DAMAGE TO THEM MAY BE REPORTED ABOVE MORE THAN ONCE.

CURTAILMENT OF ROLLING THUNDER OPERATIONS

On 1 April in a further attempt to get Hanoi to the peace conference table, the President of the United States stopped bombing attacks over the principal populated and food producing areas of North Vietnam except in the area north of the Demilitarized Zone where enemy actions directly threatened United States and Free World forces in South Vietnam. Because ROLLING THUNDER was thus limited, primary strike emphasis was directed against truck parks, storage areas, and military complexes. Armed reconnaissance strikes were directed against logistic vehicles and interdiction points along the main LOC's.

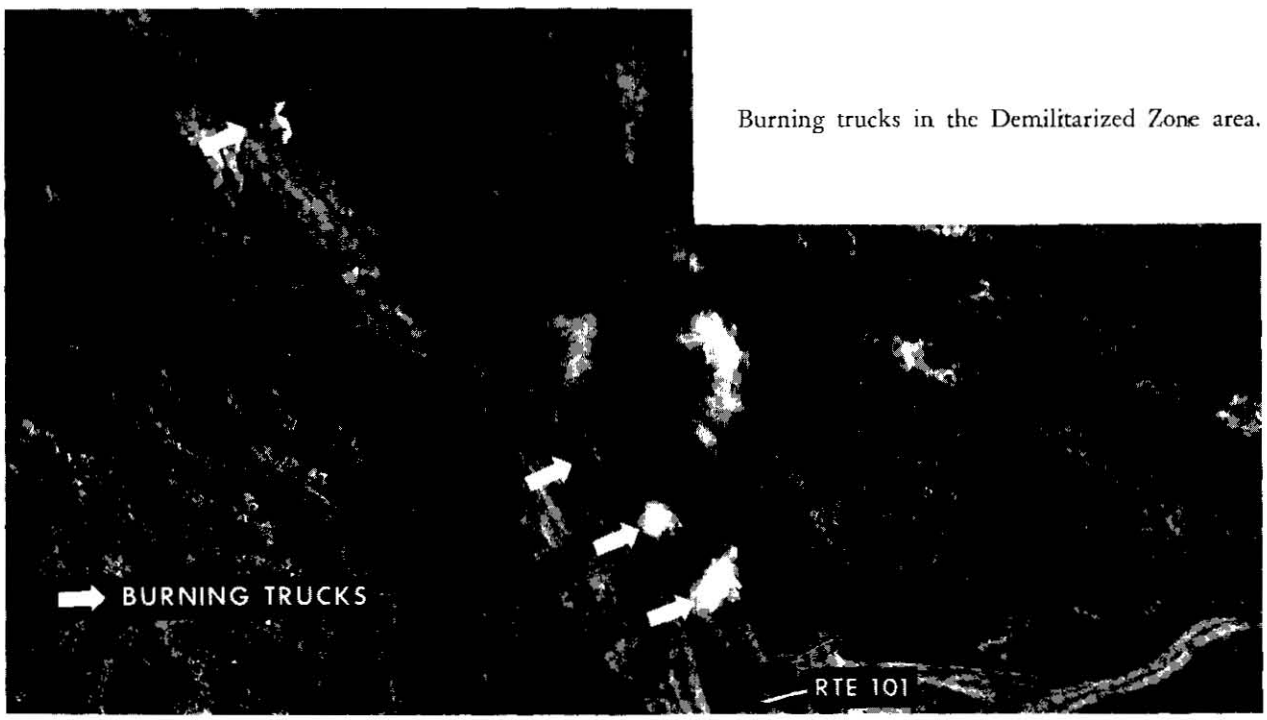
NORTH VIETNAM'S ACTIVITY DURING THE PARTIAL BOMBING CESSATION

Intelligence sources reported extensive repair and improvements to North Vietnam's LOC's underway or completed since the bombing cessation. The roads between Hanoi, Haiphong, and Hon Gai were reported to be well maintained. Bridges between Hanoi and Haiphong had been repaired and traffic flowed smoothly during day and night hours.

Limited aerial reconnaissance provided evidence of large rolling stock inventories in Hanoi and Haiphong but coverage was too infrequent to determine a buildup or increased movement. In view of the bombing limitations and apparent repairs, it is logical to assume that Hanoi moved maximum tonnages over LOC's in the northern part of the country.

South of 19° North there was evidence to indicate that intensive air strikes had resulted in shifting traffic patterns. There appeared to be a concerted effort to keep cargo moving through the use of inland and secondary routes.

Reports since the 1 April bombing limitation indicated that off-loaded cargo at Haiphong was



Burning trucks in the Demilitarized Zone area.

not being stacked but was being loaded directly onto trucks which immediately departed the wharf area. Photos revealed extensive storage throughout the port area but stockpiles did not remain static, suggesting that cargo flowed unrestricted. The labor supply at the docks was reported as adequate and efficient and the morale of the stevedores was reported as high.

Once the presence of United States aircraft over the northern portion of the country was stopped, North Vietnam took maximum advantage of the freedom of action by increasing training activities of all elements of the air defense system.

As of the date of this report, there are no indications that Hanoi is ready to negotiate an acceptable peace at Paris. The North Vietnamese delegation gives the impression that it is prepared for long drawn-out discussions. In the meantime, Hanoi continues to try to give the impression that the Communist forces in South Vietnam are strong everywhere. The offensive against Saigon begun in late May sought to undermine popular support of South Vietnam and to strengthen Hanoi's hand in the peace talks in Paris.

NORTH VIETNAM'S AIR DEFENSE SYSTEM MID–1968

The deployment and increase in the number of AAA weapons was rapid after the Gulf of Tonkin incidents. In mid-February 1965 the AAA order of battle had increased by some 1,400 weapons to a total of more than 2,100. In May 1965 searchlights were identified for the first time, and in July 1965 the introduction of 100-mm AAA enhanced the enemy air defenses by providing a gun capability against aircraft flying at altitudes up to nearly 40,000 feet. By April 1968 there were 8,000 AAA weapons, the majority of which were light AAA and automatic weapons.

In 1966, 1967, and the first half of 1968, early warning equipment continued to be modernized and increased to provide extensive overlapping coverage of all of North Vietnam and into Laos in the west and over the Gulf of Tonkin to the south and east. Altitude discrimination was enhanced by the addition of height finders. The radar net was evaluated as having the capability to detect and track aircraft above 1,500 to 2,000 feet and the net was also probably sufficiently sophisticated to maintain continuity of tracking and coordinate air defense even under pressure of multiple penetrations. GCI radars provided control for jet operations in the Haiphong-Hanoi-Thai Nguyen areas, and, for a time, in the southern Panhandle in early 1968. A total of more than 350 radars was carried in North Vietnam's inventory at the end of April 1968. Fire-control radar was believed to be increasing in the southern Panhandle following the limitation on bombing.

The concentration of our strikes in the Panhandle in April 1968 led to apparent attempts by North Vietnam's Air Force to establish a fighter capability again at Vinh, but our strikes at that airfield in May left it unserviceable. Construction continued at Yen Bai; and the airfield was capable of supporting limited operations by May 1968, thus extending the North Vietnamese air defense capability to the northwest. The bombing limitation permitted airfields to be repaired and construction projects to be resumed.

In the first months of 1968 the overall level of MIG reactions was low. However, continued individual MIG flights into the area south of 20° North demonstrated an increasing aggressiveness and refinement of tactics. Air engagements resulted in the downing of nine MIG's and eight of our aircraft. The North Vietnamese fighter aircraft inventory remained at about 20 to 25, primarily based at Phuc Yen and Gia Lam.

Observed SAM activity was relatively light because of limited United States air activity in SAM-defended areas. At the end of April the number of SAM sites identified since the beginning of the war totaled almost 300. SAM effectiveness continued its downward trend between January and April when the ratio of SAM's fired to aircraft downed was 67 to 1. As the bombing pause continued, it was expected that North Vietnam likely would move SAM units and other air defense resources to the areas south of the restricted zone.

NAVAL SURFACE OPERATIONS

Our ROLLING THUNDER air campaign was not the only means by which we took the war to the enemy in North Vietnam. Our naval surface forces also conducted a vigorous and unremitting campaign against logistic craft in North Vietnamese waters and against land targets within the range of their guns.

On 14 May 1965 the use of naval gunfire in support of friendly forces in South Vietnam had been authorized. The results that were obtained proved the value of such support.

To augment ROLLING THUNDER operations, particularly during periods of adverse weather and reduced visibility, we believed that naval gunfire could be employed effectively against North Vietnam as well. There were significant Navy resources with such capability already in the Gulf of Tonkin. These were engaged in missions of early warning and search and rescue, and they supported our aircraft carrier operations. Except for defensive action, however, this capability had not yet been exploited against North Vietnam.

CINCPAC suggested that naval gunfire could divert and dilute some of North Vietnam's defensive efforts, which were concentrated on air defense, and thereby aid in reducing pilot and aircraft exposure and attrition. On 13 May 1966 therefore, the Joint Chiefs of Staff recommended to the Secretary of Defense that naval gunfire be authorized against targets ashore and in the coastal waters of North Vietnam in the area 17° to 20° North.

Authority was received on 15 October to conduct surface ship operations against waterborne traffic in the coastal waters south of 17°30′ North, but shore bombardment was only authorized in self-defense. Attacks on watercraft engaged in fishing or in nonmilitary pursuits were prohibited.

These operations, conducted under the nickname SEA DRAGON were initiated on 25 October by the destroyers *Mansfield* and *Hanson*. Both ships proceeded to the assigned interdiction zone, which was limited to a 12-mile belt of water extending from the Demilitarized Zone to 17°30′ North. During the first day of operations both ships came under fire from North Vietnamese shore batteries, which they returned.

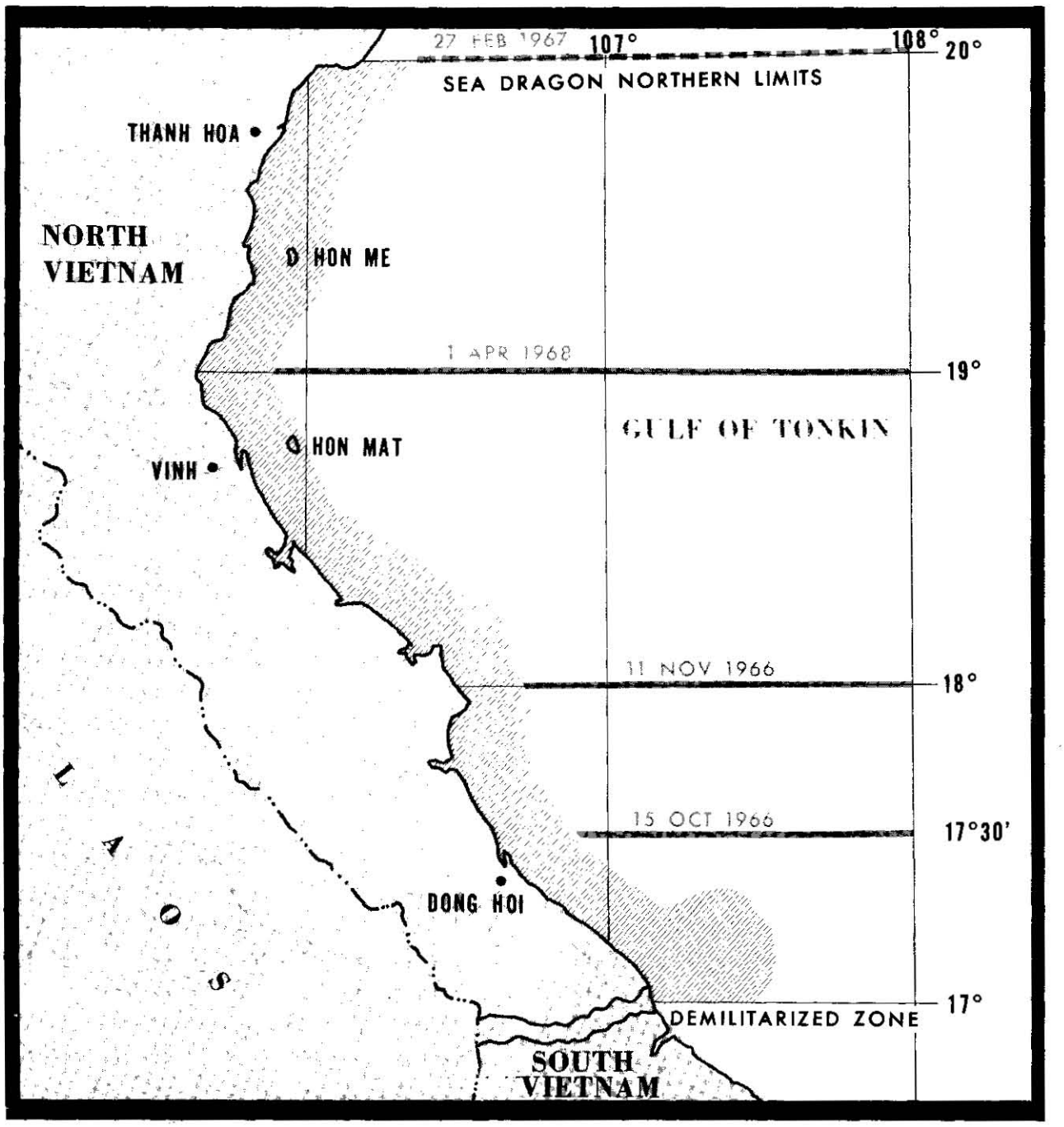
During the short period of their employment in October, SEA DRAGON forces fired 1,354 rounds of five-inch ammunition against enemy watercraft destroying 101 and damaging 94 others. Counter-battery fire totaled 426 rounds.

The Demilitarized Zone was a secure sanctuary for the enemy during the first half of 1966, not because of a lack of friendly firepower capability, but because of United States restraint. But on 20 July, the Joint Chiefs of Staff authorized limited United States actions to counter the serious threat posed by North Vietnamese Army infiltrees through the Demilitarized Zone. Thereafter, our comanders could conduct air strikes and artillery fire (land and naval) against clearly defined military activity in the area south of the Demarcation Line.

As late as 24 November 1966, however, the rules of engagement prohibited employment of artillery and naval gunfire against even clearly defined military activity in the Demilitarized Zone north of the Demarcation Line. This facilitated the establishment of extensive enemy field fortifications with particular emphasis on antiaircraft artillery.

On 11 November in connection with implementation of ROLLING THUNDER 52, the

SEA DRAGON OPERATION AREAS



northern boundary of the SEA DRAGON area was extended northward to 18° North.

By the end of 1966 SEA DRAGON forces, consisting of two destroyers on station at a time, had destroyed 382 waterborne logistic craft (a collective term for the small watercraft used to transport men and supplies) and damaged another 325, destroyed five shore batteries and damaged two, and destroyed two radar sites and damaged two more. Equally significant, SEA DRAGON had forced the bulk of the logistic movement that had been seaborne back into the crowded land routes or into the inland waterways where it was subject to attrition from the air.

By the end of the year, it appeared that the enemy had concentrated his coastal defense batteries in the SEA DRAGON area. CINCPAC proposed to the Joint Chiefs of Staff that naval surface operations in 1967 should be extended northward. Diluting the enemy's defenses would reduce the threat to friendly forces. Since the naval gunfire effort against coastal waterborne logistic traffic in 1966 proved to be an effective complement to ROLLING THUNDER operations, its extension northward would also compound the enemy's logistic problems by forcing him to transport additional materials over already overtaxed land lines of communication.

Early in 1967 the SEA DRAGON effort was enhanced by the assignment of the first Australian destroyer to the task force. Since that time an Australian ship has been on station off Vietnam either as part of the SEA DRAGON force or providing naval gunfire support to our forces in South Vietnam.

On 27 February with ROLLING THUNDER 54, the area of operation was extended to 20° North. At the same time, naval gunfire against military and logistic targets ashore was also authorized. To more effectively complement ROLLING THUNDER operations, SEA DRAGON forces were increased to one cruiser and four destroyers composing two separate task units. Attendant with the increase in ships, there was a decrease in waterborne logistic craft traffic during the first quarter of 1967.

SEA DRAGON forces continued to apply pressure on waterborne logistic craft, lines of communication, radar and antiaircraft artillery sites, and other military targets along the coastline of North Vietnam between 17° and 20° North. In May the greatest number of waterborne logistic craft detected during the SEA DRAGON campaign was encountered—635 craft. We destroyed or damaged 257 of them. On 22 May alone, elements of SEA DRAGON forces, in coordination with Seventh Air Force ROLLING THUNDER operations, struck the Quang Khe Ferry Complex in the southern portion of North Vietnam and destroyed at least 40 waterborne logistic craft.

June 1967 saw a decline in watercraft detected, and July an even greater decrease. The reduction may have been due to a decrease in availability of or a reluctance on the part of the enemy to expose the craft available to him. On the other hand there was a significant increase in the number of land targets struck in July, 518 as compared to the previous monthly high of 374 in March. SEA DRAGON forces tripled the July figure in August when 245 logistic craft were damaged or destroyed. Over 1,000 fixed or moving targets were taken under fire.

In September SEA DRAGON forces continued patrolling between 17° and 20° North. The number of waterborne logistic craft sighted decreased considerably over the previous month. SEA DRAGON forces were then moved to the Demilitarized Zone area to provide naval gunfire support for our land forces. During their absence, late in September, a marked increase in waterborne logistic craft and truck activity was observed and the SEA DRAGON forces were returned to their regular missions.

During the fourth quarter of 1967 there was a 62 percent decrease in the number of waterborne logistic craft detected compared to the third quarter. This decrease could be attributed to a combi-

nation of poor weather and the continued deterrent of SEA DRAGON forces. In the same period, however, 1,707 land targets were struck as compared to 1,258 in the third quarter, a 36 percent increase.

During 1967 the number of ships assigned to SEA DRAGON at any one time fluctuated. In one instance there were eight ships assigned, but normal force composition was five ships, a cruiser and four destroyers, operating in two task units.

CINCPAC recommended that a battleship be made available to take advantage of its greater firepower. As a result, in August, the Department of Defense approved the reactivation and refitting of the mothballed *New Jersey*, with deployment scheduled for the fall of 1968.

Damage to our ships from North Vietnamese coastal defense artillery was light in comparison to the damage and destruction they caused. Although the accuracy of North Vietnamese gun crews improved throughout the year, it appeared that evasive action and other tactics employed by our ships offset the improved accuracy of coastal batteries.

After one full year of operations, SEA DRAGON ships had destroyed or damaged over 2,000 waterborne logistic craft, attacked over 3,300 selected shore targets, and engaged in over 150 duels with enemy shore batteries. They significantly reduced the movement of supplies in the coastal waters and assisted in the interdiction of land routes within their gun range.

Seaborne infiltration of enemy personnel and supplies from North Vietnam was considered by this time to be making a relatively small contribution toward meeting requirements. Naval surface operations had reduced this enemy capability. As in the ground war, however, the enemy appeared willing to accept high losses and continued his attempts to resupply in certain hard-pressed combat areas.

During the first three months of 1968 the enemy increased pressure along the Demilitarized Zone and stepped up logistic movement in the southern portion of North Vietnam. SEA DRAGON ships were shifted southward to provide increased naval gunfire support for our forces in the general area of the Demilitarized Zone. Only two destroyers patrolled the southern SEA DRAGON area, yet 34 percent of the detected waterborne logistic craft were destroyed or damaged. Land targets taken under attack remained high, but the poor weather precluded adequate assessment of results. The April 1968 decision to limit attacks on North Vietnam to the area below 19° North further reduced the SEA DRAGON interdiction zone by one-third, but in the area where operations were permitted our ships continued to distinguish themselves.

EFFECTS OF ROLLING THUNDER

Despite operational restrictions, weather cycles, and a resourceful enemy, ROLLING THUNDER operations had a profound effect on North Vietnam. By April 1968 when air operations over the northern areas were stopped, North Vietnam was faced with numerous and serious problems. The cumulative effects of air operations and the demands of the war in South Vietnam resulted in unprecedented stresses and strains on the North Vietnamese economy, production and distribution systems, the life of the people, and the political control apparatus. Conditions may have been sufficiently serious to have induced North Vietnam to use the tactic of "negotiation" to gain a period of relief in order to rectify its more pressing problems, and to reinvigorate support of the war in South Vietnam.

Perhaps the most significant manpower drain was caused by the rapid expansion of the armed forces to supply replacements for the war in the south and to man air and coastal defenses in the north. In addition, workers were needed to repair and maintain the vital lines of communication. This included the repair of roads and rail lines, and reconstruction of bridges and ferry crossings damaged or destroyed by our air campaign. Another important manpower requirement was for the rapidly expanded air defense system. Workers were needed for site construction and as laborers at the many hastily built radar, antiaircraft artillery, and surface-to-air missile sites. Most of these people came from agriculture; and women, children, and old people were forced to fill the manpower gap in the economy.

In addition to the manpower problems, air operations affected farm schedules and compounded problems caused by bad weather, resulting in a reduced output of food. ROLLING THUNDER also complicated the government's collection and distribution of food and impacted on the narrow margins of agricultural sufficiency.

Air operations destroyed most of North Vietnam's heavy industry and power generating capability. Hanoi was forced into a defensive posture marked by frustrations and delayed aspirations. Transportation and industry were forced to disperse, thereby creating problems dealing with the redistribution of labor, allocation of raw materials, and control of output. The attendant managerial problems were immense.

North Vietnam's exports drastically declined from the 1966 average of 100,000 metric tons per month to tonnages on the order of 20,000 per month. This decline was attributed to the bomb destruction of industry, interdiction of lines of communication, and the disruption of port operations.

The air operations caused a decline in the standard of living, particularly for the urban dweller but also for the rural peasant. Dislocation of people, interdiction of transportation, destruction of goods, and more stringent rationing of all commodities including food and clothing impacted adversely on the people and were in varying degrees attributable to ROLLING THUNDER. Shortages of food, particularly rice, affected the cities, but imports continued to provide marginally sufficient food. Food consumption levels continued to be stringent and caloric intake appeared to drop to levels that threatened the effectiveness of the working force.

The impact of ROLLING THUNDER on morale in North Vietnam was a difficult matter to assess. Prior to the more intense air operations,

the morale of the people had not been an overriding concern of their government. Under the intensified air attacks, morale appeared to have slipped, particularly in the urban centers, as the people tended increasingly to question the propaganda concerning their ultimate victory.

All of these economic and sociological problems were in varying degrees a result of air operations. The stresses they created contributed to an increased divergence between the authoritarian ideals and objectives of the government and its actual capability to control and manage. As air operations intensified, North Vietnam responded with increased concern for internal security, particularly as it related to control of the people during air raids. The physical relocation of government offices and ministries from the capital and the interdiction of transportation and communications introduced confusion and even greater inefficiencies.

Cessation of bombing has allowed a reconstitution of lines of communication and a return to a more normal pattern of living. The North Vietnamese had long demonstrated extreme resourcefulness at repairing damage caused by ROLLING THUNDER. With the fear of air raids eliminated in most areas, they have worked vigorously at repair and rebuilding, particularly of their lines of communication.

Perhaps the most important measure of the effects of the bombing, however, would be the consideration of the situation if there had been no bombing at all. The uninhibited flow of men, weapons, and supplies through North Vietnam to confront our forces in South Vietnam could have had only one result for the United States and its allies—considerably heavier casualties at a smaller cost to the enemy. Since this alternative was unacceptable, the bombing of North Vietnam, as an essential element of the overall strategy, was clearly successful in fulfilling its purposes.