ABSTRACT

RANCH HAND: Air Force Herbicide Operations
in Southeast Asia. (May 1984)

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In 1961, the United States began an experiment in unconventional warfare which ultimately raised a storm of protest throughout the world and helped to destroy the credibility of an American government. Even after the experiment was terminated ten years later, the controversy continued, expanding from the original charge that the United States was doing irreparable harm to the Asian environment to an eventual accusation that the weapon used had doomed American servicemen and their future offspring to lives of pain, lessened capabilities, and even death. The weapon used was chemical herbicides; the charges are as yet unproven.

Almost unnoticed amid the furor arising over Air Force use of herbicides in Southeast Asia was the actual performance of a small group of officers and men, flying a mission virtually without precedent, originating techniques even while in contact with enemy. Code-named "Operation RANCH HAND" and dubbed the "most shot-at Air Force unit in South Vietnam, the herbicide organization dispensed over eleven million gallons of herbicides on Southeast Asian jungles and croplands, while flying unarmed, obsolescent aircraft at minimum speed and tree-top level. The handful of spray planes were hit by enemy ground fire nearly five thousand times. Nine aircraft were lost and

twenty-six crewmen killed, in addition to numerous wounded. Besides hundreds of decorations given to individuals, the herbicide organization received ten unit awards, including four Presidential Unit Citations.

Despite the turmoil aroused over the question of long-term effects of herbicide application, military commanders continued to regard it as a necessary counter to the guerrilla-warfare-favorable ecology of Southeast Asia, although some studies called part of the program "counter-productive." Cancellation of the project in 1971 was a political, rather than military, decision. More than a decade after the last spray mission in Vietnam, the herbicide issue still attracts media attention, primarily due to continuing revelations of dioxin contamination in the United States and on-going liability lawsuits concerning "Agent Orange" exposure. The questions raised during the 1960s remain unanswered, and the men of RANCH HAND remain misunderstood.

DEDICATION

In Memory of Comrades Who Wore the Purple Scarf

Staff Sergeant Milo B. Coghill
Captain Fergus C. Groves II
Captain Robert D. Larson
Captain Roy R. Kubley
Major Lloyd F. Walker
Captain Harvey Mulhouser
Captain Howard L. Barden
Airman First Class Ronald K. Miyazaki
Captain Thomas E. Davie
Lieutenant Colonel Everett E. Foster
Major Allan J. Sterns
Major Donald T. Stiefenbrunner
Staff Sergeant Irvin G. Weyandt
Sergeant Le Tan Bo, RVNAF
Captain Virgil K. Kelly, Jr.
Technical Sergeant Jacklin M. Boatwright
Technical Sergeant Harold C. Cook
Lieutenant Colonel Emmett Rucker, Jr.
Major James L. Shanks
Sergeant Herbert E. Schmidt
First Lieutenant Charles M. Deas
Master Sergeant Donald L. Dunn
Technical Sergeant Clyde W. Hanson
First Lieutenant Richard W. O'Keefe
Lieutenant Colonel Daniel H. Tate
Captain Joseph B. Chalk

And of a Special Friend
Lieutenant Colonel Merle D. Turner

the entire RANCH HAND program. Thus ended a combat organization dedicated solely to the purpose of conducting war upon the environment --to attacking plants instead of people. Created in secrecy and disbanded in controversy, this specialized warfare unit occupies a unique place in American aviation history.

The story of environmental warfare, however, did not end with the deactivation of the defoliation units in Vietnam. During the mid-1970s, while the extent and permanence of damage to the Vietnamese ecology declined to a matter of scholarly debate, a new controversy arose. As increasing numbers of American veterans of the Vietnam War claimed serious health and genetic damage from exposure to one of the primary herbicides, the "Agent Orange" issue caught the public eye far more than had the previous critiques and postmortems of the scientific and academic communities.[3]

The topic of chemical warfare was also kept before the public by allegations of Soviet activities, including reports of the use of noxious gases and toxic sprays by Russian troops against Afghan insurgents. Rumors of a new, third-generation chemical weapon, so-called "Yellow Rain," in use by communist forces against the Hmong tribesmen of Laos and other Southeast Asian opposition, attracted the attention of the press and American Congressmen. Once assailed for its gas/herbicide policies in Vietnam, the United States in the 1980s played the role of the accuser in the realm of chemical/biological warfare and counter-guerrilla tactics.[4]

Chemical/biological warfare, however, is not a recent development. Indeed, chemical weapons predate the use of bullet and bomb, themselves normally dependent on a chemical reaction as propellent or exploder, or both. One of the earliest recorded uses of chemical warfare appeared in the Peloponnesian War, when the Spartans burned wood, saturated with pitch and sulphur, under the city walls of Plataea in 428 B.C. to created choking, poisonous chemical fumes. This tactic also was used in 424 B.C. at the siege of Belium. Ironically, this crude chemical warfare surfaced again in the same area 2,300 years later when burning sulphur fumes were used against guerrilla-occupied caves during the Greek Civil War. The use of

further human slaughter." Sheridan's Valley Campaign, on the other hand, was distinctly a defensive measure designed to eliminate the Shenandoah Valley as an invasion route for Southern forces by systematic destruction of all supplies useful to a foraging invader.[8]

In the Indian Wars which followed the reunification of the American states, the Army successfully employed environmental warfare to counter the "hit and run" tactics of the plains Indians. Civilian destruction of buffalo herds upon which the tribes were almost totally dependent was applauded by the Army, and aided materially in forcing the tribes onto reservations, where they were more easily controlled. Destruction of food supplies and starvation of hostile belligerents--"whether armed or not"--also was the stated policy of General J. Franklin Bell in the Batangas Campaign during the Philippine Insurrection following the Spanish-American War.[9]

The history of "total war," however, was not extended to include modern chemistry until the twentieth century. Widespread interest in chemicals as weapons was evident in the attempts to restrict their use during the Hague Peace Conference of 1899 and the subsequent Congress of 1907, although the wording of the pledges mentioned only poisons and poisonous weapons specifically. The idea of filling shells with lethal chemicals had surfaced a half century earlier, but it was not until the First World War that widespread application of the concept was seen.[10]

First to use chemical weapons were the French. In August 1914, French soldiers fired rifle-launched cartridges filled with ethyl-bromacetate, an irritating, slightly suffocating, but non-toxic, agent. The small amount of liquid held by the 26 millimeter cartridge--approximately nineteen cubic centimeters--had little effect on the enemy. By early 1915, both French and Germans had modified standard artillery shells into improvised chemical weapons, still using irritant agents. Much more effective was the April 1915 German attack using cylinder-dispensed chlorine gas against French Territorials and the Forty-fifth (Algerian) Division occupying the line at Ypres. Despite more than two months warning of the impending attack, the French were unprepared and the front line was broken; the Germans

to reject the treaty, making it non-binding on all parties.[16]

During a Washington meeting of Central American states in 1923, and in the Fifth International Conference of American States in Santiago, Chile, in 1924, resolutions were passed denouncing gas warfare. Chemicals in war also were the subject of the Geneva Protocol of 1925, again at the instigation of the American delegation. Although the Senate had accepted the Washington Treaty provisions without a dissenting vote in 1923, the 1925 Protocol aroused widespread opposition. Anti-Protocol Senators succeeded in bottling-up the agreement in committee, where it remained until recalled by President Truman more than two decades later, in 1947, leaving the United States as the only major government to not ratify the Geneva Protocol. Despite some military opposition, Brigadier General Amos A. Fries, Chief of Chemical Warfare from 1920 to 1929, successfully lobbied against treaty restriction on chemical weapons. The lean appropriations available to the War Department in the interwar period, however, restrained the Chemical Service from a program of all-out weapons development.[17]

Chemical weapons were rumored to have been used in the early 1930s during civil strife in northern China, but the first authenticated use of chemical warfare since World War I did not occur until 1935-36, during the Italo-Abyssinian campaign in Ethiopia. Fearing that the Italian front might be broken, the Italian commander used S81 bombers to rout attacking columns of Ethiopians by spraying them with yperite, a powdered mustard agent that burned and blistered on contact. Italian aircraft also dropped grenades containing lachrymatory gas, an eye irritant, on Ethiopian troops and camps, and swaths of yperite were sprayed during advances to protect flanks and prevent ambushes.[18]

Newspaper communiques from the Spanish Civil War were another source of vivid, but unsubstantiated, reports of chemical warfare. Most stories, however, appeared to have been designed to arouse international support for one side or another (see Hugh Thomas, The Spanish Civil War). On the other hand, the Japanese reportedly made extensive use of chemical bombs, artillery shells, and toxic candles against the

the previously cited Japanese chemical use in China, the few isolated incidents which took place in Poland, the Crimea, and on some Pacific islands appeared to have been either accidents or unsanctioned acts by junior officers.[25]

In place of chemical warfare, World War II saw an increase in deliberate attacks upon the environment in the battle zones. Holland, for example, planned to stop a German invasion by a series of inundations of low-lying areas. Subsequent massive flooding in 1940 caused long-term environmental damage to the Dutch countryside, but failed to significantly delay the Wehrmacht advance. Equally futile were Russian attempts to fire the forests of Finland with "phosphor bombs" in revenge for the Finn's alliance with Hitler in 1941. Russian armies also practiced environmental warfare in their retreat from the Ukraine, pursuing German soldiers passed through a wasteland of burning villages and destroyed crops. Stalin's order that everything useful be removed or destroyed was climaxed by the blasting of the Dnieper dam.[26]

This scorched earth tactic was reversed when the Russians launched their offensive against the Germans in northern Norway in 1944. As they withdrew, the German forces carried out a program of systematic destruction of every man-made structure, including chopping down fences and dynamiting building foundations after the superstructures were burned. In a 23,000 square mile area, only a few churches were spared, forcing the Soviets to be totally self-sufficient in the harshness of this northernmost European region. This tactic, while effective, required a considerable time period and extensive manpower. In spite of this, the Germans did not yield to the temptation to resort to chemical warfare, perhaps because of the vulnerability of their fatherland to retaliation.[27]

The possibility was everpresent, however, that some country might use their chemical stockpiles, particularly if their homeland was relatively secure from attack. This possibility came perilously close to fruition during the latter stages of the Pacific campaign. By late 1944, heavy American losses due to the Japanese practice of resisting to the death caused the War Department to consider using poison gas to

in the world. In 1944 the entire program was combined and placed under the supervision of the Army's Chemical Warfare Service. Merck became special consultant to the Secretary of War and Chairman of the United States Biological Warfare Committee.[33]

One of the many ideas investigated by the War Research Service was the use of synthetic growth-regulators as weed-killers when applied in toxic doses, a concept that first occurred in the 1930s to E. J. Kraus, Head of the Botany Department of the University of Chicago. During the war, Kraus suggested to a committee of the National Academy of Sciences that these toxic properties might be practical for the limitation or destruction of crops. Further tests by Kraus and John W. Mitchell at the University of Chicago lead to an Army contract in 1943 for the work already done. The report that resulted caused the War Department in January 1944 to make herbicide research part of the work of the Biological Research and Testing Center at Camp Detrick. By the war's end, this agency had synthesized and tested almost eleven hundred defoliant substances.[34]

Field tests of inorganic defoliants in aerosol form in Florida produced mixed results. Although defoliation trials in the Chasshowitzka Swamp near Bayport caused some leaf drop, the Army Air Force Evaluation Board concluded that the length of time for significant defoliation to occur confined the tactic to "long range objects only" and therefore lacked tactical application. The same conclusion was applied to the marking of bomb lines by aerial chemical sprays. In August-September 1944, tests to defoliate and then burn tropical forests were conducted near the Marathon Emergency Airstrip on an island forty-eight miles east-northeast of Key West. These experiments were also unsatisfactory; "oil bombs," drop-tanks filled with napalm, and other incendiaries dropped after defoliation resulted in only limited burns of short duration. On the other hand, the evaluation board suggested that:

> The most important tactical application indicated for the use of ammonium thiocyanate and zinc chloride . . . is for the purpose of killing, or extensively damaging food crops, established for the support of isolated Japanese units on certain islands in the Pacific.[35]

The report apparently referred to Japanese-held islands bypassed during American advances in the central and southwest Pacific, such as Wake Island.

Following additional trials in the Florida Everglades in 1945, the Army recommended that ammonium thiocyanate be used in the Pacific theater, rather than explosives, to deny the Japanese concealment offered by tropical vegetation. The recommendation was rejected, due to the agent's name similarity with cyanide, a widely known poison. Ranking government officials were concerned that using this particular chemical compound would lead to the accusation that the United States was conducting poison-gas warfare; however, no other adequate agent was immediately available for use. "Only the rapid ending of the war," Merck later declared, "prevented field trials in an active theater of synthetic agents that would, without injury to human or animal life, affect the growing crops and make them useless." When Japan surrendered, an entire shipload of crop destruction agents was enroute to the B-29 bomber bases in the Marianas Islands, and plans had been made for "an attack on the main islands of Japan early in 1946, calculated to destroy some 30% of the total rice crop."[36]

Despite predictions of military theorists during the 1920s, chemical warfare did not dominate the field of battle in the subsequent major war. The reasons why chemical weapons were not used were varied and complex—in some instances, perhaps no more than a question of time and circumstance. There was little doubt, however, that World War II research into chemical/biological weaponry provided the basis for future exploitation in this field. Kraus's suggestions for the use of growth-regulators as plant-destroyers would find widespread application, first in agriculture and then by the military.

what a sentence Noted

matic herbicides, together with Secretary of War Robert Patterson's end-of-war order that wartime-developed scientific data not involving vital military security be published "promptly and fully," stimulated geometric growth in the agricultural chemical industry.[3]

Another chemical practice which gained general acceptance during the war was the aerial application of insecticides to control various insects in combat zones. As American forces expanded tropical operations, insect-transmitted diseases accounted for more casualties than did enemy bullets and bombs, e.g., Army Air Forces in the Pacific theater lost more man-days to mosquito-borne disease alone than to any other cause. In the Milne Bay area in January 1943, conditions were so bad that one bombardment squadron and two fighter groups were withdrawn "because of the high incidence of malaria among flying personnel of these units." Ground combat personnel were even more vulnerable to diseases such as dengue, filariasis, and fly-borne dysentery, in addition to the everpresent malaria.[4]

Although aerial spraying for mosquito control began in 1922, practical control was not possible until discovery of the insecticidal properties of dichloro-diphenyl-trichloroethane (DDT) by a Swiss scientist in 1939. Faced with staggering disease casualties in the Pacific, the Army Air Forces Tactical Center, in cooperation with the Department of Agriculture Laboratory at Orlando, Florida, and scientists from the Bureau of Etomology and Plant Quarantine, initiated a program to develop the equipment and tactics for dissemination of DDT by combat aircraft. In the United States, successful tests using single-engine Cub (L-4) aircraft were completed in October 1943 and high speed tests using a twin-engine A-20 medium bomber with modified M-10 and M-33 chemical smoke tanks followed in December.[5]

The first combat zone mosquito control flights were made by an L-4B aircraft near the Markham River in New Guinea in February 1944; the control agent, however, was Paris Green dust, rather than DDT. Further combat area tests, using both dust and liquid insecticides, indicated light aircraft were useful, but limited in capability. More effective was the B-25 "Mitchell" medium bomber, equipped with the E-1B Chemical Warfare Service smoke tank. Several B-25s in formation

ately instituted in the combat zone. Although the Air Staff initially considered sending the Langley flight to the Far East on Temporary duty, the eventual solution was to activate a new organization in Japan, the First Epidemiological Flight, led by a former commander of the Langley unit, Major William M. Wilson. Using three C-46 transport aircraft from the 437th Troop Carrier Wing at Brady Field, Japan, and four L-5 liaison planes borrowed from the Army, the Fifth Air Force spray flight became a major element in the preventive medicine campaign in Korea.[12]

The lack of peacetime research and preparation in spray operations was reflected in the medical flight's jury-rigged equipment. The C-46s were prepared for insecticide work by installing two 450-gallon long-range auxiliary gasoline tanks, normally used by four-engine C-54 transports, in the belly compartment. Two fuel pressure pumps forced the insecticide through perforated pipes clamped to the underside of the horizontal stabilizers, creating a crude, but effective dispersal apparatus. When the Army L-5s proved uneconomical and unsafe as insecticide aircraft, four World War II T-6 "Texan" training planes, being used as forward control aircraft, were obtained from Far East Air Forces Headquarters and modified by bolting a 110-gallon aluminum tank under the fuselage between the main landing gear. Chemical dispensing was accomplished through a simple electrical "open-shut" electrical valve and a gravity feed/venturi system. Although this primitive mechanism provided satisfactory spray patterns, the aircraft load factor* and resultant control sluggishness made flight with a full insecticide tank extremely dangerous. A more acceptable light aircraft for spraying was eventually found when the Army and Air Force ordered a number of Canadian-built DeHavilland "Beavers," subsequently designated the L-20. In the meantime, the achivements of the First Epidemiological Flight, despite equipment

*The T-6 was not intended to carry a load such as imposed by the tank of insecticide, and the location of this weight, needed to allow the tank to clear the runway while on the ground, caused an extremely far forward center of gravity, making the aircraft both overweight and very unstable.

Production of 2,4-D, first publicly tested in 1945, climbed to 14 million pounds by 1950 and 36 million pounds by 1960. Production of 2,4,5-T, insignificant in 1950, reached nearly 10 million pounds in 1960, while production of all herbicides exceeded 75 million pounds. The chemical industry rushed to develop new herbicides that were more effective, more selective, and less hazardous than compounds previously used. Chemicals such as picloram, bromacil, cacodylic acid, and paraquat became widely used in agriculture, forestry, and to control vegetation along roads and power lines. Sales of herbicides rose from $2 million in 1950 to more than $129 million in 1959, when American farmers alone treated 53 million acres.[22]

The year 1959 also saw the first large-scale attempt at airborne military defoliation. Camp Drum, New York, had a serious vegetation control problem. Extensive tree coverage, predominately sugar maples, was blocking observation of artillery shell-bursts in a four square-mile area of the firing range, but the trees could not be cleared by normal means because of the sizable number of unexploded shells in the area. Chemical defoliation from the air appeared the best solution, and the task was assigned to the Biological Warfare Laboratories at Fort Detrick. Military funds for defoliation were not available, so the job was complicated by restriction to the use of on-hand materials.[23]

By June all available materials had arrived at Camp Drum. The experimental spray apparatus from Fort Detrick was designed for use on an H-19 helicopter, but the only aircraft available was an H-21, so the equipment was modified on-site. The only chemicals available for the operation were from the 1952 Air Force stocks, which had been later declared surplus and transferred to the Department of Agriculture at Beltsville, Maryland. This supply consisted of approximately one-thousand gallons each of pure butyl 2,4-D and butyl 2,4,5-T, a fortunate circumstance, since these chemicals were ideal for the task at-hand. The two chemicals were mixed in a one-to-one ratio, and the mixture was sprayed over the artillery area during fifteen flights in an eight-day period. Despite the handicaps presented by jury-rigged equipment, pilots untrained for aerial spray operation, and applica-

Thanksgiving Day fabricating and fitting new armor plating to allow the C-123s to depart on schedule the following day.[22]

In the meantime, SASF's aircraft were transferred to flyable storage, except the two C-123s undergoing insecticide modification at the Middleton, Pennsylvania, depot. To supplement SASF personnel, fifty-one volunteers with C-123 experience (nine pilots, two navigators, and forty maintenance personnel) were selected from the Air Transport Wing at Pope. Although they could not be told anything about the mission, it clearly involved duty in Vietnam, and the volunteers were required to sign statements promising not to reveal where they were going or what they were doing when they got there. (Mail was received through a box number in the Philippines.)[23]

Another five pilots and four navigators were assigned to supplement the overwater ferry crews and then return to Pope; the C-123 had no autopilot and at least two overwater legs were more than fifteen hours long; the extra crewmembers provided for three pilots, a navigator, and a flight mechanic aboard each ferrying aircraft. Two huge C-124 "Globemaster" transports accompanied the smaller planes, carrying maintenance personnel, enroute support equipment, and supplies for 120 days sustained field operations. To avoid publicity, the deployment was included by supplement in the operations plan for FARM GATE. A separate operations order using the code name RANCH HAND was published after the unit's arrival in the Philippines.[24]

The six C-123s left Pope on 28 November 1961 on a non-stop flight to Travis AFB, California--a flight plan deliberately selected because it would exceed the distance of the longest overwater leg enroute to Vietnam. Not only would the flight test the long-range capabilities of the modified aircraft, but it would give the aircrews badly needed cruise control data for planning the overwater legs; there had been no time to test the chemical tank and external wing-tank fuel system performance, there were no engine oil quantity gauges, and existing planning data might not be applicable. Bad weather at Travis and a malfunctioning wing-tank on one plane forced the mission to divert to George AFB, California. The trip experience indicated, however, that the aircraft were capable of safely flying the overwater legs (a

CHAPTER IV

DEVELOPMENT OF THE HERBICIDE PROGRAM[1]

The transfer of three of the six spray planes to Saigon on 7 January took place under strict security conditions. Publicly, the aircraft were part of the MULE TRAIN airlift support unit (346th Troop Carrier Squadron), but on arrival at Tan Son Nhut airport they did not join the other C-123s ~~on the ramp~~; instead, the spray planes were placed ~~parked~~ on the closely guarded Vietnamese Air Force security ~~area~~ parking ramp reserved for President Diem's special fighter squadron. Since news media personnel were prohibited in this area, it was hoped that this would prevent any publicity concerning American participation in the chemical mission. The Commander of the security ~~area~~ ramp--and of the special "anti-coup" VNAF squadron--was a highly experienced combat veteran, Lieutenant Colonel Nguyen Cao Ky. This important figure in the history of the Republic of Vietnam, famed for his black flying suits, pearl-handled pistols, and purple scarf, would be closely associated with the RANCH HAND organization throughout its service in Vietnam.[2]

Operational headquarters for the spray unit was also located in the ~~security area~~ guarded zone, while the enlisted personnel initially were quartered in a hastily erected "tent city" on the Saigon airport. Water and bathing facilities were in short supply, a problem compounded when most of the Americans fell prey to intestinal diseases, commonly referred to as the "GIs" or "Ho Chi Minh's revenge." Security for the aircraft was provided by armed VNAF guards, but after a morning pre-flight discovery that all planes had been sabotaged by cutting control cable turnbuckles, and a later incident in which a Vietnamese guard was discovered at 0500 hours with his throat cut, American ground crewmen began guarding their own aircraft at night, in addition to their normal daily workload. These were temporary inconveniences, however, since it was optimistically expected (= hoped) that the RANCH HAND crews would finish their mission and return to the United States within ninety days (the PACAF deployment

increase to three aircraft and crews. One of the returned aircraft and crews was again deployed to Vietnam, arriving in September in time to take part in the Ca Mau project. Between 3 September and 11 October, six canal target areas were attacked, with missions flown almost daily. The flat target terrain presented the RANCH HAND crews with no new problems, although some enemy ground fire was received. Since spray aircraft were the only ones flying sustained low-level flights, Viet Cong anti-aircraft gunners apparently were inexperienced and the ground fire was ineffective. None of the hits caused serious aircraft damage or injury to crew members.[26]

Following completion of the Ca Mau targets, defoliation activities again came to a halt. A number of survey missions were flown to check on effects of the spring tests and another round of training missions was started to familiarize two more replacement crews with the latest techniques, two of the three RANCH HAND crews having completed their 120-day TDYs. Captain Marshall also rotated home, replaced by Captain Mike Devlin, an original "rancher" returning for a second tour. (Delvin's apartment at 62 Tran Hung Dao would be the informal RANCH HAND headquarters during the entire history of the operation from Saigon airport). Marshall returned to the TAC Special Aerial Spray Flight at Langley, which subsequently became responsible for training RANCH HAND replacements in addition to its domestic insecticide mission.

In December, defoliation missions were ordered against road targets in a mountain pass south of Qui Nhon. The modifications in equipment and procedures had proven effective in the Ca Mau canal defoliations, with 90 to 95 percent improved visibility, and higher headquarters now endorsed the herbicide program. At the conclusion of the Qui Nhon project, however, spraying was once more stopped until the systemic herbicides again became more effective with the beginning of the growing season in May. During 1962 RANCH HAND aircraft had flown a total of only 60 defoliation missions while dispensing 49,240 gallons of herbicide over 20.1 square miles, but it appeared that this new weapons concept had finally found political and military acceptance.[27]

had recently been installed in Vietnam. To warn of enemy air attack against South Vietnam, ground radar facilities also had been established to provide an air-to-air intercept capability. RANCH HAND aircraft flew a number of missions, including low-level flights, acting as simulated enemy targets for Ground Controlled Intercept (GCI) radar operator and F-102 interceptor pilot training. Survey flights over previously sprayed targets and potential target areas continued during this period.[31]

An indication of the effectiveness of the earlier herbicide missions was the increasingly strident tone of communist anti-herbicide propaganda. Radio Hanoi broadcasts in English to Europe and Asia claimed that hundreds of persons had been "affected by noxious chemicals," becoming "blind," "unconscious," and suffering "swollen bodies." Colonel Ha Van Lau, Head of the Liaison Mission of the Vietnam People's Army High Command, sent a message to Indian Ambassador R. Goburdhun, Chairman of the ICC, accusing the United States of violating international law and the Geneva agreements by its "barbarous" acts. Local cadres spread the word among villagers that the chemicals were deadly to both people and their animals, an act that sometimes backfired when it caused panic among the rural population. To counter Viet Cong propaganda that the herbicide project was a terror program designed to force the peasants into strategic hamlets, South Vietnamese officials conducted demonstrations of the chemical sprays in the villages, including applying herbicide mixtures to their skin to prove its harmlessness. The United States' answer to the communist propaganda barrage was to hold briefings for the press in March on all aspects of the defoliation operations in South Vietnam and to encourage widespread publicity of the spray unit, a policy change Assistant Secretary of State Hilsman had been advocating since his March 1962 trip to Vietnam.[32]

Following a high level review of the entire herbicide program, a Joint State/Defense message was sent to Saigon on 7 May 1963 delegating joint authority to initiate defoliation operations to the American Ambassador and COMUSMACV; approval for crop destruction remained in Washington, as before. Guidelines provided that defoli-

ation missions should be few in number, remote from populated areas (except in special circumstances), used where terrain and vegetation favored use of herbicides, and used only when hand cutting and burning were impracticable. The first target approved under the new system was a canal complex in the Ca Mau peninsula, similar to those attacked the previous September.[33]

In mid-May, a new crisis over the use of herbicides threatened when rumors began to circulate in the Cambodian capital, Phnom Penh, that food imported from the border province of Svay Rieng had been contaminated by defoliant spray drifting across the border. Cambodian Agricultural Ministry officials cancelled a previously scheduled trip with United States Aid personnel to the border area, and pointedly reminded American officials that Cambodian Prime Minister Sihanouk planned to visit Svay Rieng the following week. In return, the American Embassy reminded the Cambodian Foreign Office of the aide-memoire of 15 January 1962 in which the United States had assured the Cambodians that herbicides would be used "in such a manner and at such a distance from the frontier as to ensure that they do not enter Cambodia."[34] The Embassy also pointed out that the nearest defoliation and crop destruction had been "34 and 114 miles respectively from the nearest point on the Cambodian border and conducted in February and on November 21-23, 1962, respectively."[35] The distances and time period made it highly unlikely that these operations could have affected the Cambodian crops, raising the possibility that the rumors were either part of a local campaign against the use of "noxious chemicals," or started to provide leverage during negotiations for increased American aid to Cambodia.[36]

The Embassy in Saigon had made an error, however, when they reported the crop destruction data. Apparently American officials had not been kept informed that crop target 2-2, site of the February sprayings, was again under attack. Using back-pack sprayers, scattered crop fields in Thua Thien Province were sprayed from 7 May until 17 June 1963; sixty-seven hectares of crops were destroyed. Even so, the error did not invalidate American claims of innocence in the Cambodian allegations; the Thua Thien site was more that one-

planes had been fired on. The retaliatory nature of this limitation did little to discourage enemy gunners, although the presence of the fighter cover provided a measure of ~~spiritual~~ emotional comfort to the spray crews. In the list of mission priorities for the fighters, RANCH HAND escort ranked near the bottom.[43]

Another suggestion to counter ground fire involved night spray missions--a suggestion reportedly made by a ~~desk-bound~~ officer at a higher headquarters, which also helps explain the antipathy toward staff officers held by former RANCH HAND members. A collateral purpose of the proposal was to increase effectiveness of the herbicide by taking advantage of the lower temperatures and wind speeds at night. The first night mission was flown on 8 December, using another aircraft above and to the right of the spray plane to drop high-intensity parachute flares so the low-level pilots could see the terrain. The mission was successful, but the flares also silhouetted the spray planes for enemy gunners. Two nights later, another mission was flown on the same target, this time using moonlight only. The pilots reported that tree-top visibility was poor, though better than with flares, and only two hits per plane were taken, despite heavy ground fire. Instead of the smoke grenade usually used to mark enemy ground fire positions for the fighters, a flare pistol with parachute flare proved successful. Night spray missions required targets with flat terrain, long straight runs, and good visibility conditions, criteria seldom met in Vietnam. More importantly, fighter support was difficult and the chances of survival and rescue if downed at night were considerably reduced. RANCH HAND discontinued the tactic.[44]

The end of 1963 found the defoliation program still not firmly established, and ground fire presented an increasing hazard; spray tactics and procedures were in a state of flux as the aircrews sought to counter the enemy threat. Most of the year had been spent on tasks other than defoliation--only 107 sorties were flown to defoliate 33.7 square miles of vegetation. Vietnamese-conducted crop destruction projects had been even more limited--destroying a mere 197.5 acres.[45] With the end of the growing season, the herbicide unit prepared once more to turn to the less hazardous, but more tedious, task of resupply.

CHAPTER V

THE DEVELOPING WAR

The use of herbicides in Vietnam was not intended as a complete answer to the problems of jungle warfare. A 1962 "Talking Paper" prepared for a meeting between the President of the United States and the Chairman of the Joint Chiefs of Staff concluded:

> Certainly some of the projects we are implementing are outright R&D [Research and Development, i.e., experimental] efforts such as the defoliation project and bear all the earmarks of gimmicks that cannot and will not win the war in South Vietnam.[1]

The use of such "gimmicks", however, was designed to demonstrate the depth of the American commitment to Vietnam--a means of emphasizing that the United States would not allow unanswered aggression in South Vietnam and Southeast Asia. Like the tank and the airplane in World War I, herbicides were ~~at first~~ an unknown and untried weapon of war, but ~~by~~ 1964 ~~it was obvious that their usefulness was becoming accepted. The~~ program ~~had gone~~ beyond the "gimmick" stage and gave indications of widespread applicability in future conflicts.

The American ~~status~~ role in Vietnam, however, was uncertain. The number of United States "advisors" had peaked at 16,732 in October 1963, and the withdrawal of 1,000 of them beginning in December seemed to confirm official statements that the Vietnamese army had become an effective force, requiring only logistical support and limited technical advice in the future. The murder of President Diem and his brother in Saigon in November, followed by President Kennedy's assassination only a few weeks later, however, cast a shadow of uncertainty over what course the war would take and what roles the new leadership would play. The weakness of the fragmented, unstable South Vietnamese government was quickly exposed in February 1964 when the Viet Cong inflicted a major defeat on ARVN forces in Tay Ninh province, forcing American officials to again consider a major escalation of US involvement.[2]

Meanwhile, the onset of the dry season in January saw the RANCH

HAND detachment again tasked with the mundane missions of logistical support as part of MULE TRAIN and flying test sorties for the TAPS project. Unlike the previous year, however, the dry season did not cause the herbicide program to be completely shelved. In addition to several survey flights to evaluate previous targets and to map proposed new ones, four defoliation sorties were flown against the target abandoned in December. The following month, sixteen more spray sorties were flown against a new target, a large canal at the tip of the Ca Mau peninsula. In an unusual joint maneuver, small Vietnamese patrol boats provided area security during the spray runs; only light ground fire was received and no serious damage resulted.[3]

The situation changed drastically in March and April. Additional new targets on the Ca Mau peninsula were too far inland for the Navy to secure, and the Vietnamese government could no longer make ground forces available for this purpose. Moderate enemy small-arms fire was encountered. Hits on the spray planes averaged four per mission, causing damage to various electrical and hydraulic systems. Twice, when landing gear was shot up, emergency landings were made. One problem with these southern target areas was the open water areas and open fields between tree lines, which gave the enemy relatively clear zones to track and fire on the low-flying aircraft. Furthermore, insurgent forces in the peninsula had been significantly strengthened in manpower and weapons. Viet Cong boasts that they were strong enough to take any town at any time were corroborated when they overran the district capital of Kien Long on 12 April.[4]

Thus when a four target river complex south of the city of Quan Long (Ca Mau) was assigned in mid-April, RANCH HAND crews decided to use a recently developed "pop-up" tactic, plus target rotation, to reduce their vulnerability, particularly since some of the targets were in an area which had been VC-controlled for almost four years. The "pop-up" procedure was an approach to the objective "on the deck" (20 feet or less above the terrain), then climbing suddenly to the 150 foot spray altitude at the last minute, giving the enemy little time to aim and fire. Between targets, the aircraft would again drop to minimum altitude. Target rotation involved changing the target

schedule on a daily, random basis, rather than completing all runs against one target before moving on to the next, as in the past. Hopefully, this procedure would preclude VC anticipation of the next day's target and prevent enemy concentration of heavy weapons along the spray paths.[5]

Despite the change in tactics, spray planes continued to suffer three to five hits daily, although without serious damage until 30 April. Attacking a canal target early on the thirtieth, a two-ship flight encountered what looked like mortar air-bursts and very heavy .50 caliber machine-gun fire from both sides of the canal. ~~Caught in a~~ cross-fire, the lead aircraft ~~was hit~~ fourteen times and the copilot was wounded. Besides forty holes from shrapnel, damaged engine instruments forced the crew to shut down the right engine and make an emergency landing at Soc Tang. The crew was picked up by the second aircraft and returned to Saigon. Spray crews put part of the blame for the successful ambush on the Army's Psychological Welfare unit, which had dropped 450,000 leaflets in the area telling of the forthcoming defoliation. MACV temporarily suspended further defoliation missions pending re-evaluation of procedures.[6]

As a result of the subsequent MACV study, a new policy required scheduling a primary and an alternate target for each mission. Thus, if the pilots encountered a "hot" target, they could break off and change to one that might be less active. Not scheduling sorties onto the same target complex on more than two consecutive days was also made command policy.[7]

While all this was going on, another significant change was made --RANCH HAND changed from a temporary duty unit to a permanent organization. In April the first two permanent (PCS) pilots arrived, Captains Wilbur I. Robinson and Tony T. Tellez. Because this first PCS crew did not include a fight mechanic, a volunteer was obtained from the C-123 logistics support squadron, recently redesignated as the 309th Troop Carrier Squadron (Assault). Future replacement crews, scheduled to arrive in August and September, were to include flight mechanics. The detachment also was left without a navigator, and again had to turn to the troop carrier squadron for a volunteer.[8]

The nineteenth of May saw RANCH HAND return to defoliation, this time in a supposedly secure area along the canal west of Tan Hiep. All three aircraft possessed by the unit were used, and the first two day's runs were met by only sporadic ground fire. On the third day, heavy fire from directly ahead of the aircraft, where the crew had no protection, caused the spray run to be discontinued. The decision was made to return for a fourth straight day, but with fighter pre-strike against the area of heavy ground fire. The pre-strike was to be timed to take place just before the spray planes' arrival. Unfortunately, lack of coordination caused the fighters to miss their target by two miles and the RANCH HAND aircraft were heavily hit--lead aircraft losing its hydraulic system and number three having both the spray pump and a generator knocked out. All aircraft safely landed at Saigon.[9] The need to avoid repeated, consecutive runs over the same target area had again been violently emphasized.

While MACV selected new targets in the Delta, RANCH HAND twice moved north to Da Nang to defoliate lines-of-communication between Vietnamese army posts along the rugged Vietnam-Laos border area of I Corps tactical zone. Thorough coordination with the host base enabled the spray unit to move and be prepared for operations in only one day. Using a fast-loading procedure which cut turnaround time to approximately ten minutes, three "lifts" (herbicide sorties) per aircraft could be made in only three hours; targets planned for two or three days of operations were finished in a single morning. The unit commander credited this rapid completion for minimizing enemy reaction and reposition of forces; only four hits were taken during twenty-six sorties.[10]

Even without strong enemy opposition, these northern sorties were particularly hazardous. Defoliation in a "mountain" area required a different technique than the "flat-land" runs in the delta. The experience gained from the December 1962 Qui Nhon pass and July 1963 Da Nhim power line projects proved invaluable. To increase maneuverability, gross weight was reduced by decreasing fuel loads to the absolute minimum consistent with safety. Extra care was taken in flight planning to ensure that spray runs were made in the direction

of the downhill slope--low airspeed and high power setting left little margin for error or battle damage recovery if the run was made over rising terrain. Even under ideal conditions, the single-engine rate of climb capability (one engine shut down and the propeller fully feathered) was less than 100 feet per minute. Equally important, the violent turns necessary to follow the winding roads and trails through the narrow mountain valleys required extraordinary crew coordination and precise aircraft control--the 110 foot wingspan of the C-123, when matched with tree-covered hillsides and steep turns, could quickly reduce terrain clearance to zero in the hands of a careless crew.[11]

By July 1964, the RANCH HAND flight was again at Saigon and facing a return to their old nemesis south of Quan Long. The spray planes had been driven from the target before they could make a second application of herbicide in April, and the one and one-half gallon per acre initial application was ineffective; the entire target complex would have to be resprayed. RANCH HAND crews anticipated heavy enemy resistance. The government had lost control of most of the Ca Mau peninsula and the Viet Cong were equipped with increasingly more and better anti-aircraft weapons. To give some badly needed protection to the vulnerable flight mechanic, his position at the spray console in the rear fuselage was modified by the addition of a three-foot square, open-topped box made of two half-inch thick sheets of Doron armor plating--adequate to stop most small arms projectiles and pieces of shrapnel.[12]

When spraying was resumed the expected enemy reaction occurred and hits were taken on all missions, including a 16 July attack in which the two-ship flight received fourteen hits each. In retaliation for the heavy fire received on these An Xuyen Province targets, a new tactic was tried on 17 July. A decoy C-123 was used to draw ground fire, exposing VC anti-aircraft positions; then, four VNAF and eight USAF fighters attacked the revealed sites with general purpose and fragmentation bombs, napalm, and 20-millimeter cannon fire, setting off two secondary explosions. Normally, heavy escort of this type was not available to RANCH HAND; fighter planes were in limited number, and defoliation escort had the lowest priority; however, it was hoped

that this example might cause enemy gunners to think twice before exposing their positions by firing on future RANCH HAND missions. Operations against the An Xuyen target complex were finally completed on 22 July.[13]

Less than a week later, RANCH HAND made international headlines when the Cambodian Minister for Foreign Affairs, Huot Sambath, charged the governments of South Vietnam and the United States with conducting chemical warfare against Cambodian territory. In a letter to the President of the United Nations Security Council, he alleged that Vietnamese planes ~~were alleged to have~~ sprayed several Cambodian villages in the Dandaungpich region of Ratanakiri Province with "poisonous yellow powder" between 13 and 23 July. The attacks were reported to have caused the deaths of seventy-six persons and some domestic animals.[14] The French-language press in Phnom Penh amplified the charges, claiming that the "powder" caused "syndromes of fatal gastroenteritis" among the people of six villages.[15] The Hanoi and Liberation Front Radios took up the refrain, reinstituting their campaigns against chemical spraying. The radio broadcasts also claimed that spraying in Ca Mau on 7-8 July caused local protests and "mass meetings" to demand indemnities from the Saigon government.[16]

The Cambodian charges appeared to parallel those of the Pathet Lao, who a month earlier had accused the United States of poisoning both people and oxen in Cammon Province by sending "a plane to spray poisonous chemicals."[17] Ratanakiri Province was a primary infiltration route for Viet Cong supplies and reinforcements, lying adjacent to the South Vietnamese central highlands, opposite Kontum and Pleiku. The Vietnamese Foreign Minister, Pham Huy Quat, denied the Cambodian charges, suggesting that if poisonings had taken place it had been at the instigation of Viet Cong terrorists attempting to damage relations between South Vietnam and its neighboring countries.[18] An investigation by the American Embassy at Saigon indicated that neither the Vietnamese nor the United States had conducted any herbicide operations in the three Vietnamese provinces nearest Ratanakiri during the period in question. Furthermore, none of the herbicides used by the RANCH HAND organization, ~~or ground~~

units were dispensed in powder form. The Department of State recommended that the Vietnamese government ask for a United Nations medical team investigation, although it was earlier pointed out that this request might serve to dignify the charge.[19] The Cambodian government rejected the idea of an outside investigation, by either the United Nations or the International Red Cross. Instead, they continued to claim violation of Cambodian territory, including fresh charges that two South Vietnamese planes spread toxic powder over the Bost Touk region on 11 August. The inhabitants reportedly became ill when they ate contaminated vegetables from the area. The validity of these 1964 chemical warfare charges by Cambodia, like those of 1963, were never independently verified.[20]

The acceptance of defoliation as a viable tactic of warfare, earlier indicated by the arrival of permanent duty aircrews, was further confirmed on 30 July 1964, when RANCH HAND was designated as Detachment 1, 315th Troop Carrier Group (DET 1, 315 TCG), a part of the PACAF mission forces. Parking and operations for RANCH HAND remained in the VNAF security area at Tan Son Nhut airport and the crews maintained their separate identity from the other C-123 personnel, affectionately referred to as "trash haulers."[21]

More important than the title change were the modifications being made to the equipment. In 1963-64, tests at Range C-52A, Eglin AFB, Florida, and on the calibration grid at Pran Buri, Thailand, indicated that higher rates of application (2.5 to 3.0 gallons per acre) were needed to provide more complete and long-lasting defoliation. This rate was achieved in early 1964 by making two passes over each target area, but only at the cost of increased exposure to enemy anti-aircraft fire. The 1963 PACAF-proposed solution for a quick-removable spray module capable of delivering up to three gallons per acre was still under development and testing. As an interim measure, however, a "quick-fix" modification was achieved in August 1964 by locally installing two 20-horsepower pumps in the existing MC-1 system. Together with some changes in the plumbing, these pumps were capable of delivering a flow of 430 gallons per minute of Purple, adequate to deposit 3 gallons per acre over a 240 foot wide swath. Between August

and November other modifications were made to the aircraft, primarily at the suggestion of the RANCH HAND crews, including: stripping the aircraft of unnecessary equipment to lighten it; installing a workable FM (frequency modulation) radio to provide direct communication with ground units and forward air controllers; and installation of Doron armor "half-moon" cut-outs in front of the instrument panels to provide limited "head on" protection for the cockpit area.[22]

The C-123 had proved itself a tough, dependable aircraft, capable of absorbing considerable punishment. Originally designed in 1945 as the XCG-20, a "powered glider," the C-123 retained the heavy-duty glider structure in the fuselage and empennage, including a tow-ring attachment point in the nose section, giving it a simple, but very strong, airframe. Control systems were dual-cabled for safety and the engine-nacelle fuel tanks had self-sealing bladders; the nacelle section containing the tank was installed on bomb shackles and could be electrically jettisoned in an emergency. Power was provided by two extremely reliable 2500-horsepower Pratt and Whitney R-2800-99W engines. Purchased as an assault transport in 1951, the Air Force authorized Fairchild-Hiller to produce 398 "B" models of the C-123 "Provider."[23]

Compared to the modern USAF century-series jet fighters, the C-123 appeared outdated and ungainly. Declared obsolescent in 1956, the Air Force planned to retire the "Provider" from the active inventory in 1961. Yet at the peak of American involvement in Vietnam early ten years later, four full squadrons of cargo C-123s and the oversize squadron of spray-modified C-123s were still actively engaged in combat. Pilots assigned to RANCH HAND and the other C-123 units initially looked down their noses at the snub-nosed, high-winged transport. The aircraft, however, matched the exact needs of the Vietnam theater, and of RANCH HAND in particular. Their missions required a close match of man and machine; performance had to be sensed, not judged by reference to complex instruments. Herbicide sorties, relative to other Air Force operations of the era, especially, were a throwback to the 1920s--to the days of barnstorming and "seat-of-the-pants" flying.[24]

As a temporary organization, RANCH HAND crews had tested and

proven the tactics of herbicidal warfare. In two and one-half years, RANCH HAND aircraft had flown more than 800 total sorties, using over 300 spray sorties to dispense more than 250,000 gallons of chemicals over 80,000 acres. Never equipped with more than three operational aircraft and crews at any one time, the unit developed the defoliation concept at a cost of two aircraft and three crewmen, in addition to a number of wounded. Tactics and procedures still had room for refinement and modification, but the organization had demonstrated itself capable of meeting an increased demand for herbicide missions--43 percent of all defoliation to date was accomplished in the four months preceeding redesignation as DET 1, 315th TCG.[25] By mid-July 1964, the days of flying ~~logistics~~ colloq. - redundant support and "make do" sorties just to keep busy appeared a thing of the past; defoliation as a weapon was no longer experimental.

but you said this already - earlier - ??? earlier elsewhere

The changes taking place in the chemical operation in Vietnam, however, were overshadowed by two events--an American election and an attack on United States Navy vessels in Asian waters. 1964 was a presidential election year in the United States, and Vietnam occupied a key place in the rhetoric of the various candidates. The front-runner for the Republican Party nomination caused an uproar when he reportedly proposed using low-yield atomic weapons to defoliate forests along South Vietnam's borders to expose enemy supply lines. It did little good for a Los Angeles spokesman for Senator Goldwater to point out that the candidate was merely saying such plans had been studied. Nor could Goldwater explain that he was referring to the 1950 Fifth Air Force contingency plan; as a reserve Air Force General Officer he was privy to the information, but this information remained classified Top Secret, preventing further disclosure.[26] ~~In any case, to the~~ general public, ~~the alternative of nuclear defoliation made chemical operations appear to be the much more acceptable option.~~ for. needed

Public opinion was further influenced when the Tonkin Gulf incident took place in August. The supposedly unprovoked attack on American vessels, apparently well off-shore in international waters caused both the public and Congress to support expanded United States involvement in Southeast Asia, almost without question.[27] Newsmen had little time

with little Community & Mass - how about polls? see Public Opinion Quarterly - or Editor & Publisher

Don't understand what polls would add?

to comment on, or even notice, the organizational realignment of an insignificant three-plane unit.

Even as the redesignation was taking place, however, it was obvious to RANCH HAND officers that the unit would soon have a new responsibility, replacing the VNAF as the primary agency for attacking the enemy subsistence system. Destruction of enemy crops, frequently referred to by the more acceptable term "food denial," was an outgrowth of the original Project AGILE "Task 2" tests in 1961. Until 1964, the program was exclusively a VNAF mission; the Vietnamese used five HIDAL spray units mounted on H-34 helicopters to spray various targets with relative inefficiency. Final approval over specific targets was a joint responsibility of top officials in the United States Department of State and the South Vietnamese government, operating under a well-defined set of criteria. VNAF field officers, however, sometimes failed to get permission before destroying crops in areas of marginal VC control [probably out of frustration due to the complex and time-consuming approval system, as noted in the 1963 herbicide evaluation]. Delays and poor results also resulted from inexperienced pilots, equipment failures, and lack of motivation on the part of the aircrews—the H-34 helicopter being especially vulnerable to small arms ground fire.[28]

As a result of the VNAF problems and the findings of the 1963 investigation, approval procedures for both crop and defoliation missions were simplified. Following delegation of approval authority for defoliation targets to the American Ambassador Saigon and COMUSMACV in 1963, responsibility for hand-spray defoliation was further decentralized to the ARVN division level in January 1964 (this did not apply to hand-spray of crops). Ambassador Henry Cabot Lodge, who replaced Nolting in August 1963, had requested authority to conduct crop destruction missions throughout Vietnam on the same basis as defoliation. Pending action on his original request, on 3 January Lodge asked for delegation of authority for a single area within War Zone D. The Ambassador assured the State Department that: "As a general practice I intend to insist that every request for crop destruction be signed by either Gen. Don, Gen. Kim, Gen. Minh or the

Prime Minister before I affix my signature."[29] Secretary of State Rusk approved the second request on 12 January, and asked Lodge to submit a list of other areas under Viet Cong domination where he and General Harkins (COMUSMACV) believed crop destruction "is necessary and justified." In February, a list of twelve areas outside South Vietnamese control was submitted, and in March, Lodge and Harkins were authorized to conduct crop destruction in these areas without further reference to Washington; acting jointly with the American officials would be a "responsible top-level GVN military or civilian authority," usually Lieutenant General Nguyen Khanh, then President of the ruling Revolutionary Council.[30] Each operation, however, had to be reported to Washington, and attacks were to be preceded by psywar (psychological warfare) and civic action preparations. Relief and compensation procedures were to be used to help affected civilians. The Ambassador's authority was further expanded on 29 July to "all chemical crop destruction operations in Vietnam," but targets still required the personal approval of "one senior GVN official, i.e., Khanh, Khiem, or Vice Premier." Secretary Rusk warned General Maxwell Taylor, who had replaced Lodge as Ambassador on 1 July, that: "Crop destruction remains [a] matter of serious political concern here and political aspects must be given careful consideration by Saigon before approval each operation."[31]

Although VNAF's July-August crop spray missions in Binh Thuan Province achieved an 80 percent crop destruction level, Taylor was dissatisfied with overall results. RANCH HAND was directed to assume part of the crop mission responsibility under the FARM GATE concept, i.e., using mixed USAF/VNAF aircrews. To provide for the increased workload, an additional spray-modified C-123 was requested from TAC. Thus, just as defoliation finally gained military acceptance and project requests were esculating rapidly, RANCH HAND found itself ~~with~~ an ~~additional,~~ more hazardous and even more controversial task.[32]

The crop mission forced RANCH HAND to once again develop a new set of procedures and tactics. VNAF-developed procedures did not help; they applied to helicopters, not to fixed-wing aircraft. American domestic spray experience, civilian and military, had even

less application to crop destruction than it did to defoliation. Nor were the recent hard-won defoliation tactics totally compatible with crop missions. Defoliation runs were usually flown on a single heading--with occasionally one or two fairly easy turns. Herbicide normally was dispensed in one continuous spray; nearly 1,000 gallons during a 14 kilometer (8.7 mile) run of about 4 1/2 minutes duration. Even lines-of-communication targets in the mountains, ~~with their~~ requiring more violent maneuvering, were commonly sprayed with a continuous run. Defoliation aircraft flew in a loose echelon formation, like the last three fingers of a hand, aligned away from the direction of planned turns, all aircraft spraying on and off at the same time, as directed by the lead ~~aircraft~~ ev. Including initial descent to low-level and post-target climbout, exposure to most enemy weapons was only eight to ten minutes; to the aircrews it seemed considerably longer.[33]

Crop destruction was different. Enemy cultivations were primarily of the "slash and burn" type--small scattered openings in the forest surrounding enemy fixed locations, such as base camps, logistics centers, and staging points, and along infiltration routes. Targets were assigned by specifying a "target box"--a set of coordinates outlining a relatively unpopulated area not under government control--in which cultivated crops were grown by the Viet Cong or their sympathizers. Extensive planning and coordination was needed to destroy these cultivations just prior to harvest, when it was too late to replant, but after the enemy had invested a maximum amount of effort in raising their crops. Timing was critical. Crop missions in extensive target areas, such as mountain valleys, were flown in a modified "V" formation, much like the middle three fingers of a hand, with "Lead" in the center , spraying crop up the middle of the valley, and "Number Two" and "Number Three" spraying on either side, zigzagging up and down the valley walls to catch individual cultivated areas clinging to the slopes. Each aircraft turned its spray on and off individually as the target required. On more isolated highlands targets, one spray plane often remained at a higher altitude to provide directions from one plot to another, while the other aircraft did the spraying. The planes exchanged roles back and forth until all

were out of herbicide or all targets within the box had been covered. Occasionally, the aircraft followed each other, one behind the other, diving down, dipping into the jungle to release bursts of chemicals into clearings, and roaring back into the sky, like some gigantic, disconnected amusement park roller coaster. Exposure to enemy weapons while on crop missions could be as long as forty-five minutes.

Coordination between the pilots in each plane was extremely critical. The left seat pilot flew the aircraft, maintained vertical and horizontal position in relation to the other aircraft, spotted targets, held the proper spray altitude, and turned the spray on and off with a switch mounted on the control yoke. The right seat pilot controlled the power, monitored all engine and flight instruments, kept the airspeed within limits, maintained fore-and-aft spacing vis-a-vis the other aircraft, helped spot targets, and followed up on the control yoke. In a sense, the two pilots had to operate as one individual with four hands and four eyes; each had to anticipate the other's actions, and the reactions of the aircraft; each had to be prepared to take-over instantly if the other pilot was hit. While low-level flight is inherently dangerous, in such situations it was even more so.

RANCH HAND had to consider another factor in planning for the crop destruction program--vigorous enemy reaction. Because these targets were vital to the enemy war effort, they would be strongly defended. By the nature of the target locations, large numbers of personnel and weapons would be available to act in this defense. The terrain surrounding most crop targets favored the defender and often forced the attacker into obvious routes of assault, along which the defense could concentrate its weapons. Restrictions on the rules of engagement which required pre-attack warning by psywar units, and the short vulnerability period of crops to efficient attack, narrowly defined the time when particular targets could be struck, thus allowing further concentration of enemy defenses. RANCH HAND anticipated that crop missions would meet more ground fire than defoliation had; this anticipation soon became reality.

The American spray unit began its first crop attacks on 3 October

Is it true all while LBJ is denying intent to escalate? ....?? ??
If so, so what? God knows that politicians don't 69 & can't always say publicly what they are really doing!

1964 in southwest Phuoc Long Province, a food-raising region adjacent to a major enemy base camp area in War Zone "D". The target area was titled "Project 2-14" and code named "Big Patch"; missions were flown using the mixed-crew concept--each U.S.-manned aircraft carried a Vietnamese observer. Both the C-123s and their escorting A-1E fighters bore Vietnamese insignia. On 3-6 and 12-13 October, RANCH HAND aircraft returned again and again to the target box, despite heavy resistance. By the time "Big Patch" was completed, the C-123s had been hit forty times.[34]

October also saw the beginning of defoliation attacks on Project 20-36, a Viet Cong "safe haven" known as "Go Cong." Safe havens were insurgent-controlled areas bordering Cambodia and Laos which had been selected for their natural defenses; they provided secure areas for guerrilla forces to train and reorganize, terminals for logistics resupply and reinforcement arriving through neutral territory, jumping-off points for forays against government units, and refuge for Viet Cong units fleeing GVN counter-attacks. The areas were so heavily held that South Vietnamese ground forces usually could not or would not enter them, leaving aerial attack as the only method of government action. Defoliation opened these safe havens to airborne observation and attack.[35]

In November, a second crop target was assigned to RANCH HAND. Fifteen sorties were flown between 28 November and 4 December against Project 2-19 in Phuoc Thanh Province. Aptly named "Hot Spot," the target box provided very heavy ground fire from automatic weapons. Spray formations were hit fifty times, including one mission in which an aircraft received battle-damage to the left engine, which burst into flames. When engine shut-down and use of the engine fire extinguisher failed to put out the fire, the crew was forced to jettison the nacelle fuel tank for fear that it would explode. The aircraft made an emergency recovery to Bien Hoa airfield and landed with the engine still burning fiercely.[36]

The success of the RANCH HAND assault on the Phuoc Thanh rice was indicated by a VC province committee report that "Hot Spot" attacks destroyed enough rice to feed VC troops in the area for two years.

Overall, 15,039 acres of crops were sprayed during 1964, with over 40 percent of this during the final three months, after the United States began flying crop missions. RANCH HAND sorties for the year increased to 363--spray sorties accounted for 273--and total defoliation amounted to 99.5 square miles. Herbicide consumption rose to 218,510 gallons. More indicative of the increasing use of herbicides as weapons was the utilization rate for the RANCH HAND aircraft, which averaged only 48 percent for the year, but shot up to 92 percent for the final four months of the period. The arrival of the fourth spray-modified aircraft in December gave the unit some much needed additional capacity to meet the increasing demand. The fourth plane also provided some relief for the maintenance personnel responsible for repairing battle-damage; the current rate of hits was in excess of one every other sortie and maintenance crews were sometimes hard pressed to get the aircraft ready for the next mission.[37]

Much needed relief was also on the way in the form of more aircrews. Conversion to one-year duty tours under the permanent unit concept, instead of the previous ninety-day TDYs, plus the increasing workload and more hazardous missions, meant that a spare crew was needed to provide flexibility to cover days off, rest and relaxation (R&R) leaves, and convalescence periods for wounded crewmembers. In his July End-of-Tour Report, Captain Eugene D. Stammer recommended that a fourth aircraft and a fifth aircrew be added. The departing commander's suggestions were more than accepted--the December aircraft arrival was followed in January by not only one, but two additional crews.[38]

Other changes were in store for the aerial spray organization. In mid-year, PACAF began considering replacing Purple herbicide with a less expensive 2,4-D/2,4,5-T mixture, code named herbicide Orange. Orange, however, would not be available in Vietnam until early 1965. More immediately, in December, 2d Air Division changed the rules of engagement for RANCH HAND fighter escort, requiring that all defoliation projects permit free strike zones, rather than return fire only. This change allowed development of offensive fighter tactics designed to counter and reduce the increasing ground fire RANCH HAND was

CHAPTER VI

BOI LOI WOODS TO HO CHI MINH TRAIL[1]

The overt American role in Vietnam changed during 1965. Instead of merely advising and supplying the South Vietnamese armed forces, the United States committed itself to direct combat participation on a major scale. The basis for this change had been laid by the August 1964 North Vietnamese "attacks" on the destroyers Maddox and Turner Joy, and by the subsequent Tonkin Gulf Resolution giving President Johnson virtually a free hand in Vietnam. When the inability of the ARVN to protect supporting American forces was exposed by a major mortar attack on Bein Hoa air base in November 1964, followed by a direct assault on the US compound at Pleiku in February 1965, Johnson ordered the deployment of ground combat forces to Vietnam to guard American lives and property.[2] Less than two months later, the Pentagon authorized these "guards" to use combat patrols, and additional increases in US strength would total more than 100,000 men by the end of 1965.

Operationally, these changes had little immediate influence on the RANCH HAND organization since it had been directly involved in combat from the beginning. Effectively, however, the influx of United States combat units meant a dramatic increase in defoliation mission requests as American field commanders discovered the advantages of chemically "opened" jungles. Moreover, when interrogation of Viet Cong prisoners and defectors suggested that crop destruction had significantly affected enemy logistics, demands for such projects also mounted. Reportedly, in late 1964 food had become so scarce in the central highlands and War Zones C and D that VC forces had to "live largely on food grown by their own production units."[3] Food procurement activities absorbed "over one-third of the manpower and up to 50 percent of the time of many Viet Cong units." Aerial spraying also was claimed to have caused relocation of enemy camps and units because many Viet Cong soldiers believed the spray was "dangerous to their health."[4]

and the imminent maturity of the crops.[12]

Taylor's decision was questioned by the State Department, which expressed concern about possible adverse civilian reaction in the area and potential widespread international criticism. The American Embassy was asked for a review of local reactions to previous crop destruction actions. The issue was further complicated on 22 March when a MACV press conference admitted the use of irritant gases in Vietnam. The resultant furor in Washington caused the State Department to suggest that "while 'gas' uproar is running its course", the Binh Dinh operation should be "reduced in visibility" if it could be done without causing problems with the ARVN, who hoped to regain control of the province after the herbicide attacks. Despite contrary claims, it was clear the Vietnamese expected the Binh Dinh project to force local inhabitants to move to government-dominated areas.[13]

Again on 25 March, the State Department warned Saigon that "publicity should be avoided as far as possible."[14] The American Embassy advised Washington that spray aircraft would operate out of Nha Trang and Qui Nhon, and would spray only the "least conspicuous area," remaining prepared to interrupt spraying if "any adverse reaction observed." In the meantime, target area 7 was cancelled, since harvesting had already taken place and, in an apparent change of the Ambassador's mind, target area 5 was deleted because of its proximity to populated areas.[15] On 26 March, when Vietnamese observers scheduled to fly on RANCH HAND aircraft failed to appear, more sorties cancelled. Overall, these various delays and changes in the operation destroyed its potential effectiveness, since many areas were at least partially harvested by this time.[16] To replace the original program, a limited operation was authorized in a remote section of the province. Secretary Rusk expressed hope that this reduced project would be ignored by the press, as they had ignored crop destruction in the past. American officials in Saigon were told to keep the entire operation "low key" and to let the Vietnamese government speak first if the press found out.[17]

Although some Binh Dinh crops were destroyed, much rice was harvested, including four million pounds in target areas 5 and 6

fighter sorties.[22] This projection was far beyond the existing fighter capacity in Vietnam at the time. Even after the war effort was later expanded, this unrealistic level of support per mission was achieved in only a few isolated, exceptional instances. It is hard, however, to fault the impractical demands of RANCH HAND planners who regularly faced increasing numbers of enemy guns while flying slow, unarmed aircraft at low-level.

Adding to the confusion over fighter support was the debate within RANCH HAND over how fighters should be used. One faction felt surprise was essential in reducing enemy ground fire, and argued that fighter pre-strike only alerted the enemy; they therefore felt that fighters should hold at a distance from the target area until after spray aircraft began their run. A second faction held that herbicide operations could not be concealed due to approval criteria, restricted application factors, and the lack of secure communications within Vietnamese channels used to get approval of targets, free-fire zones, and support. This faction claimed Viet Cong agents learned of daily mission orders even before the SASF did, and that such security leaks made little difference anyway, since once the project was begun, it was obvious where subsequent runs would be made. Thus, they argued, surprise was impossible and emphasis should be placed on measures to keep the enemy's heads down--the "he can't shoot if he's ducking" theory.[23] This debate over methodology continues, unresolved, at reunions of RANCH HAND veterans, ~~long after the spray organization ceased to exist~~ obviously

During MACV's re-evaluation of the defoliation concept, RANCH HAND again reverted to hauling cargo alongside the other 309th aircraft. In addition to routine logistical sorties, in June, SASF aircraft participated in a "rice lift" to supply the population around Ban Me Thout (Lac Giao) in the central highlands, which the Viet Cong had almost totally isolated. In July, the spray crews returned to their herbicide tasks, with forty sorties against crop targets in Binh Dinh and Kontum Provinces (Project 2-23). August saw a reduction to only twenty-four sorties; long delays in approval of new targets sometimes left the unit with only a single active project. Change was

again in the air, however, and MACV was making plans for a significant increase in the herbicide operation. The restrictions limiting crop destruction to remote, unpopulated areas were eased in August by Washington, allowing the targeting of more populated areas where shortages of local food supplies were already causing the VC difficulties. A further alteration came in September when authority for defoliation by ground-based power equipment was delegated to Corps level.[24] Essentially, only aerial defoliation still required joint approval by the Ambassador and COMUSMACV.

To meet the ~~projected~~ increased ~~in~~ workload caused by the relaxed criteria, the aircraft authorization and manning of the Special Aerial Spray Flight was increased by three aircraft, nine pilots, five navigators, and five flight mechanics, almost doubling the size of the unit. The new crews received C-123 transition training at Eglin Air Force Base Auxiliary Field No. 9 (Hurlbert Field), Florida, and spray training in Virginia from the Langley AFB insecticide spray unit. The additional aircraft were ferried to Vietnam by ~~the new~~ crews, after spray modification at the Fairchild-Hiller plant at Crestview, Florida, arriving on 13 November 1965. ~~While the planes were enroute~~, USAF Headquarters recognized the unique configuration of the spray-modified transports ~~by~~ redesignating them as UC-123Bs.[25]

During August and September, crop and defoliation targets in Kontum, Binh Dinh, Khanh Hoa, Tay Ninh, and Bien Hoa Provinces were attacked; sixty-seven sorties took only sporadic ground fire. On 20 October, the spray flight, now commanded by Major Russell E. Mohney, launched a major operation (Project 2-28) against War Zone D, a Viet Cong stronghold northeast of Bien Hoa which had resisted all efforts at government control since before World War II. For the first time, RANCH HAND aircraft were supported by newly arrived F-100 and A-4 fighter-bombers, in addition to the propellor-driven A-1s. Through close association, the F-100s would eventually become RANCH HAND's favorite close-support aircraft. Over the next two month, 163 sorties sprayed 137,650 gallons of chemicals on the triple-canopy forest covering a concentration of bunkers, base camps, and trails in Zone D. The proximity of this area to fighter support from Bien Hoa

Air Base made it an ideal alternate target when spray missions had to cancel primary targets due to weather or enemy activity.[26] Over the next five years, War Zone D became one of the most defoliated parts of Vietnam.

Arrival of the additional aircraft gave SASF the capacity to work several projects simultaneously, even when one or more planes were out-of-commission from battle-damage. This added flexibility allowed eighteen sorties to be used in late November to defoliate river banks along the Oriental River (Project 20-58), without neglecting the War Zone D Project. In December two long term projects in Kien Hoa (20-55) and Phuoc Tuy (20-68) Provinces were started at the same time. Enemy ground fire remained a significant hazard, with thirty-four hits recorded on the Oriental River sorties and a mounting toll of hits from the other targets. A single four-ship attack on a delta target in Kien Hoa on 19 December added nine hits to the total during a four minute run; the aircrews reported the use of rifle grenades as a crude, but impressive, substitute for anti-aircraft guns. Almost half the aircrew members assigned to RANCH HAND in December 1965 had been wounded at least once and their aircraft had a total of nearly 800 hits; one of the older planes, nicknamed the "Leper Colony," had been hit 230 times and its occupants had earned eight Purple Heart medals.[27]

To counter the increase in hits, particularly in the cockpit area, RANCH HAND crew members began using flying helmets equipped with a clear visor which could be lowered to protect the eyes. Used in place of the standard headset while on the spray run, the helmet, together with a flak-jacket, offered pilots and navigators extra protection from flying shrapnel and glass. Twice in December this protection allowed crews to complete runs despite cockpit damage, although it did not prevent them from receiving minor wounds. Some extra-cautious pilots also checked out a second flak-jacket to sit on.[28]

In early November, herbicide planners got an indication of future problems when, for two days, the spray planes remained on the ground due to a lack of chemical. Since mid-year, the cheaper Orange

herbicide had totally replaced Purple as the primary defoliant chemical; Blue herbicide was used predominately for crop targets. The increasing ability of the SASF to meet field requirements, however, caused chemical consumption to outstrip the supply system.[29] At the time, the chemical shortage was only a minor, momentary inconvenience, but soaring herbicide usage eventually caused major procurement problems in the United States.

In December, RANCH HAND flew the first herbicide sorties outside South Vietnam when they began a long-term project to expose enemy supply routes in Laos. This transportation network, leading from North Vietnam to the Cambodian border, was known as the Ho Chi Minh Trail, and served as the primary route for supply and reinforcement of Viet Cong forces. Two spray planes were deployed to Da Nang Air Base, and the first sorties were flown on 6 December. Very mountainous terrain, bad weather, and heavy enemy resistance combined to make this target complex the most hazardous to date. Despite the difficulties, by the end of the month UC-123s from Da Nang and Bien Hoa flew more than forty sorties into southern Laos, defoliating almost twenty-four square miles of trails and roads with over 41,000 gallons of herbicide.[30]

During 1965, RANCH HAND had flown 897 spray sorties in Vietnam, defoliated 253 square miles of vegetation and destroyed approximately 68,000 acres of crops. Although nearly three times the area sprayed in the preceding year, it did not approach the 14.5 million acres treated with herbicides of one type or another in the United States during 1965. Even so, the organization began to attract the attention of the press, particularly after gaining the reputation "of being the most shot at airmen operating over South Vietnam."[31]

Newsmen were not the only ones to notice the 309th spray flight. Air Vice-Marshal Nguyen Cao Ky, who had been Prime Minister of South Vietnam since June 1965, continued his long association with the RANCH HANDs by flying with them on target. Afterwards, Premier Ky gave his violet-colored flying scarf to the aircraft commander of the spray plane, saying: "These are your colors, wear them with pride."[32] The "purple" scarf thus became one of the symbols of the spray organ-

ization, and was retained in spite of several later attempts to prohibit its being worn. In one instance, after General William C. Westmoreland's MACV Headquarters decreed a ban on the wearing of unauthorized uniform items by US personnel in Vietnam, a special dispensation was granted for RANCH HAND scarves after a phone call to Ky, who then called the American Ambassador, who, in turn called the MACV Commander. Reportedly Ky threatened to close the gates of Tan Son Nhut Air Base if the spray crews were forced to take off their scarves.[33]

RANCH HAND crew members were also identifiable by a distinctive patch depicting a broad purple stripe diagonally across a green background and surrounded by a yellow circle with red lettering, "RANCH HAND VIET NAM." In the center of the purple stripe was the silver Chinese character for "Purple." Designed by Captain Allen Kidd and Lieutenant John Hodgin in 1962, the insignia represented the herbicide mission and the close ties between the organization and South Vietnam.[34]

Distinct identification of RANCH HAND personnel by patch and scarf was not always advantageous. Rumors within the unit claimed that special bonuses had been offered for anyone shooting down a spray aircraft and that a reward had been offered for the capture or death of individual crew members. Spray personnel regarded these rumors more as testimony to the effectiveness of their mission than as a serious threat to their own safety. In December 1965, however, a residence occupied by RANCH HAND flight mechanics was subjected to a terrorist grenade attack--five of the six occupants were wounded. While this was not the only terrorist attack of 1965 and was, perhaps, only coincidental, it seemed to support the anti-RANCH HAND stories.[35]

The increasing enemy threat, on the ground and during missions, appeared to concern the spray personnel very little. Indeed, the aircrews seemed exhilarated by exposure to enemy fire. The low level and slow speed of the UC-123, plus the open cockpit windows and troop doors, meant that the crews could clearly hear the weapons being fired at them, reminding some of the almost constant popping of firecrackers on the Fourth of July. When a round struck the fuselage or cockpit

area, the UC-123 resounded like a garbage can struck with a baseball bat, and the ever present rank smell of herbicide was frequently tainted with brief acid whiffs of gunpowder. Captain Paul Mitchell of Florence, Alabama, told a New York Times correspondent: "It's a funny thing. When we get shot at, everyone is laughing and talking [after the mission]. When we don't get shot at, people hardly say a thing."[36]

It became a tradition that new crewmembers buy champagne for the squadron at a "cherry party" the first time their plane was hit. Few newcomers lasted an entire week before having to host such affairs. Later, when the RANCH HAND organization grew to number over one-hundred members, four and five "cherries" sometimes occurred on the same day, leading to parties which were monumental in scope and damages; on these occasions the officer's club often ran out of champagne, and the host base commander ran out of patience with RANCH HAND disregard for military courtesy and decorum. Only an occasional ill-fated crewman had the bad luck to keep his thirsty compatriots waiting to initiate him into the "Order of the Punctured Provider," although the lack of a "cherry" candidate did not distract from the almost daily parties, either at the club or at someone's villa. "Someone getting wounded," "No one getting wounded," "Glad to be alive," and "It's a dismal day" (for those times when the weather was too bad to fly) were also excuses for a RANCH HAND party.[37]

The constant series of parties, in the tradition of aviators of previous wars, provided a coping mechanism by which the crewmembers avoided thinking of the dangerous environment in which they operated. The parties did not hinder accomplishment of the mission; in December alone, an all-time high of 182 herbicide sorties were flown--more than the total for the first two years of operation in Vietnam. Preliminary operations plans by Seventh Air Force indicated that this record would not stand for very long. More forest-burning experiments, expanded operations in Laos, defoliation of the Demilitarized Zone--all were on the planner's boards for 1966, in addition to the ever-expanding, but more routine, defoliation and crop destruction missions within South Vietnam proper.[38]

CHAPTER VII

FLIGHT TO SQUADRON: MORE PLANES, MORE HITS, MORE PROBLEMS[1]

On 7 January 1966, RANCH HAND celebrated the beginning of its fifth year in Vietnam. Superficially, the seven aircraft of the expanded unit appeared little different from the three which arrived in 1962; they were even parked in the same area of th Saigon airport ramp. Operationally the differences were enormous--from a small experimental project in day-to-day danger of cancellation, RANCH HAND had become an integral part of the "greatest American gathering of airpower in one locality since the Korean War." By the first of the year, over five hundred planes and twenty-one thousand men of the United States Air Force were in Vietnam, in addition to other units operating over Southeast Asia from bases in Thailand and Guam. Army fixed-wing aircraft and helicopters swarmed over all parts of South Vietnam, while off-shore, aircraft carriers of the United States Navy contributed more planes to the air armada. American troop strength, increased to nearly 150,000 men in 1965, and augmented by forces from Australia, New Zealand, the Philippines, Thailand, and Korea, would further expand during 1966 to reach 385,000 men.[2]

The crews of the spray planes, however, had little time to contemplate the meaning of the widening American role in Southeast Asia; they were too busy trying to keep up with the growing list of approved herbicide targets. The monthly record of 182 sorties, newly set in December, was quickly surpassed in January as 188 herbicide sorties dispensed 177,300 gallons of chemical. Besides continuing the Kien Hoa, Phuoc Tuy, and Laos projects, another forest fire experiment (Hot Tip I and Hot Tip II) was attempted in January and February. The target of 22,000 gallons of Orange defoliant was twenty-nine square miles of heavy forest on the slopes of the Chu Pong mountains, near the Ia Drang River valley, southwest of Pleiku. After giving the defoliant time to take effect, Guam-based Strategic Air Command B-52s bombed the area on 11 March with M-35 Incendiary Cluster Bombs; the heavy bombers were immediately followed by F-4 and F-100 fighter-

circled at 500 to 700 feet, spotting trail segments and marking them with smoke grenades. After dropping three grenades, the planes dove down and sprayed that section, flying from one marker to another before the smoke dissipated. By repeating this tactic, long stretches of the trail were gradually marked and exposed. Also frequently used was the standard mountain technique of having one aircraft at 500 feet "talk" the other aircraft along the trail as it sprayed. Again, this tactic was not used in "hot fire" areas due to the extreme exposure of the overhead aircraft.[7]

Where the trail was not at least intermittently visible from overhead, or where heavy ground fire was expected, the second new tactic consisted of short defoliation burns at 90 degrees to the suspected trail position, made every half mile or so. This allowed photo reconnaissance to map the trail and RANCH HAND then returned to defoliate the trail using time-and-distance dead-reckoning. These spray runs often revealed ingenious enemy attempts to conceal its road network. For example, in several areas lattice-work trellises overgrown with natural vegetation made living tunnels several miles in length. By February, the RANCH HAND navigator at Da Nang, Captain D. B. (Pete) Spivey, was able to present Seventh Air Force with the first accurately plotted 1:125,000 mile scale map of the Ho Chi Minh Trail south of Tchpone, Laos.

In February the Laos defoliation project spread north of the 17th parallel, to expose segments of the infiltration route along the North Vietnamese/Laotian border. Some sorties on these northern sections of the trail were flown out of American bases at Nakom Phenom and Taklai, Thailand, with the concurrence of the Thai and Laotian governments. On at least one mission the spray planes penetrated North Vietnam to defoliate the Ban Karai Pass. Escort was provided by B-57 "Canberra" bombers to cover helicopter rescue in case a spray plane was shot down. In an unexpected role reversal, one of the bombers was downed, and the UC-123s remained overhead to relay radio instructions and help direct rescue helicopters to the site.

Throughout the next two months defoliation in Laos continued, primarily along Laotian designated routes 92, 922, 96, and 965 below

request had to be refused; there were no replacements and the headrest had to be repaired and reinstalled.[12]

While not working on the planes, the ground crews, in the words of a flightline controller of the period,

> scrounged (stoled[,] begged and borrowed) any and every thing we could find on base, that was not heavily guarded, by that I mean a guard with a loaded M-16 pointed at you, that we could use or swap to someone for something we could use. . . . You always would keep both eyes peeled for anything that we could use and that we could acquire one way or another.[13]

Supporting the controller's words was the stripped frame of a Case tractor parked in the RANCH area; the tractor had mysteriously disappeared from the ramp at Clark Air Base in the Philippines at the same time a RANCH HAND aircraft transited the base.[14]

The overall RANCH HAND effort continued to expand throughout the spring. In March, 163 defoliation sorties sprayed 148,450 gallons of herbicide, and the following month the sortie rate increased another 20 percent, even though maintenance crews were frequently unable to repair one day's battle damage in time for the aircraft to fly the next day. By May, herbicide consumption exceeded 200,000 gallons for the first time, in spite of the temporary withdrawal from Da Nang. In recognition of the growing workload borne by only seven spray aircraft, in April COMUSMACV requested eleven more aircraft be assigned to the RANCH HAND mission.[15] These additional spray planes would also make possible a new program of area defoliation in regions of heavy enemy concentration, such a War Zones C and D and the Iron Triangle. The request coincided with the loss in June of the first RANCH HAND aircraft since 1962.

On 20 June 1966, two defoliation aircraft were spraying a multiple-pass target in Quang Tin Province in I Corps, in an area known as the Pineapple Forest. Both aircraft had received some ground fire during each of the first four passes. On the fifth pass, one plane had an engine shot out and crashed in a hedgerow at the end of a rice paddy. The pilot, Lieutenant Paul L. Clanton, was badly injured and trapped in the burning wreckage. Fortunately, the left side of the aircraft had been peeled wide open, and the other crew members, Lieutenant Steve Aigner and Staff Sergeant Elijah R. Winstead, freed

capacity, prevented more than temporary shortages of herbicides in Vietnam from developing.[20]

Despite the herbicide supply problems, the arrival of three more UC-123s in August allowed the SASF to exceed 200 sorties in a month for the first time. Contributing to the high sortie rate was the beginning of area defoliation in nearby War Zone D and a return to spray operations in the Mekong Delta, under Project 4-20-1-66. Once more IV Corps provided spray crews with an opportunity for special heroics. On 31 August a three-plane flight attacked a target area twenty-eight miles southwest of Can Tho, where two previous missions had met intense ground fire. On the third attack, the flight began taking fire while still descending to spray altitude. Shortly after the run began, the number two aircraft lost its left engine to enemy fire. The other two aircraft closed in beneath the vulnerable aircraft to protect it from further damage, although both had also been hit themselves--the number three aircraft had fourteen hits and its pilots were partially blinded by defoliation fluid on the windscreen. By the time the flight cleared the target area for an emergency landing at Binh Tuy, the three aircraft had taken a total of thirty hits, bringing the unit's monthly accumulation to 119.[21]

Ironically, even as the spray planes were subjected to heavier enemy ~~resistance~~ ground fire, the need for their escort by fighters was questioned at higher headquarters. Shortly after the assignment of General William W. Momyer as Commander, Seventh Air Force, he ordered the discontinuance of the four flights of fighters per day that were dedicated to protection of UC-123 operations. The SASF commander, Major Ralph Dresser, immediately went to Seventh Air Force headquarters to brief General Momyer and his Deputy for Operations, Major General Gordon Graham, on the need for fighter cover for critical RANCH HAND missions. Dresser suggested that the spray targets be classified according to threat; category A would be "hot" areas of known ground fire, which required pre-strike; category B would also be "hot" targets, but could be flown without prestrike, using overhead escorts only; category C targets were in areas of unknown enemy resistance, requiring minimal escort in case heavy fire was

withheld area just south of the demilitarized zone; the latter briefly caused newspaper headlines when the Department of Defense spokesman mistakenly identified the attacks as taking place within the DMZ. On 23 September, another press briefing correctly identified the spray area as the infiltration and base camp area of the North Vietnamese 324B Division, lying between the DMZ and Route 9. Three days later, however, General William C. Westmoreland, Commander of US Forces in Vietnam, asked Washington's permission to begin defoliating a fifty square-mile section of the DMZ, running from the Laotian border to the South China Sea on the south side of the Ben Hai River. Westmoreland justified his request on the need to expose North Vietnamese infiltration routes across the DMZ, since the International Control Commission had been unable to fulfill their obligation under the Geneva Accords to prevent illegal penetration of the neutralized area. In October, the request was expanded to include defoliation of the northern half of the Zone and adjacent routes in North Vietnam. Washington approved the attack on the southern section, but further DMZ attacks were deferred pending a MACV assessment of the political/military results of the initial project. In the meantime, RANCH HAND was not idle; 247 sorties in September and 315 in October were flown against various targets throughout South Vietnam.[25]

Early in October, the commander of the SASF received orders assigning the unit to the 14th Air Commando Wing at Nha Trang. A few days later, these orders were rescinded and, on 15 October 1966, the Special Aerial Spray Flight was redesignated as the 12th Air Commando Squadron and assigned to the 315th Air Commando Wing. Temporarily the organization remained at Tan Son Nhut, under the command of Major Dresser, but planning was begun for relocation of the new squadron to Bien Hoa Air Base, home of the USAF 12th Tactical Fighter Wing.[26] The apparent reason for making the RANCH HAND squadron a part of the 315th, an airlift wing, was logistical--to simplify maintenance and supply support since both organizations used C-123 aircraft. The extreme differences between the two primary missions, however, would cause ~~future~~ problems between the subordinate and parent organizations.

The change in operating locations was welcomed by RANCH HAND for several reasons. Besides leaving the impossibly over-crowded ramp-space and air traffic pattern of the Vietnamese capital's airport, the herbicide unit was particularly interested in taking advantage of the move to establish a permanent hydrant system to supply chemicals to the aircraft. Using condemned 5,000 gallon F-6 refueling trailers joined in tandem, and a system of high pressure pumps, a "herbicide pit" was built adjacent to the south end of the new parking ramp, allowing the rapid servicing of up to four aircraft at a time with any of the three herbicides in use. This Bien Hoa bulk storage facility could hold up to 90,000 gallons of herbicide, in addition to the 55-gallon drum storage area. The new system also made it easier for the Vietnamese handlers to transfer chemical from the shipping drums to the bulk mixing tanks. A similar, but smaller, facility was constructed at Da Nang, using nine old refueling trailers. When Bien Hoa officers inquired about possible problems from the servicing area, Major Dresser warned them that fumes from mixing and servicing herbicides probably would denude the vegetation on a small hill with a pagoda immediately south of the storage area. Similar damage was done to trees at the Saigon airport terminal, which was located a short distance "downwind" from the RANCH HAND parking area on "Charlie" row at the airport.[27]

While RANCH HAND planned the move to Bien Hoa, the accelerated attack against targets throughout Vietnam and Laos continued. The persistent problem of herbicide shortages led to an attempt to stretch the available supply by increasing per-gallon coverage. In October, a test project was begun to spray the mangrove forests along the main shipping channel to Saigon (in the Rung Sat Special Zone) with Orange herbicide at one and one-half gallons per acre, half the normal flow rate. This allowed each sortie to defoliate six hundred acres. A similar rate was applied during two missions into Project 4-20-1-66 in the delta region. Although mangroves were highly susceptible to Orange herbicide, by November it was evident that the reduced rate was ineffective, confirming data from the previous test in Thailand.[28]

RANCH HAND was also hampered by increasingly poor weather.

During the month of October, 315 aircraft reached scheduled targets, but weather conditions forced cancellation of an additional 153 sorties. The effect was particularly noticeable in I Corps, where only 78 sorties were flown. At the same time, the hit-per-sortie rate soared as the reduced number of northern flights took fifty-five hits. The figure was deceptive, however, since almost half of these hits were received on the eighth of the month during a single mission.[29]

The target was an area of enemy crops in three adjacent valleys immediately north of the A Shau Valley, a Viet Cong stronghold. The area was known to be well defended and the rugged surrounding terrain made it unlikely that a UC-123 could escape the valley if an engine were lost. The importance of the target, however, outweighed the hazards and a three-plane formation was scheduled for the attack. On descent into the first valley, heavy ground fire was met immediately and all aircraft were hit during the run. While the flight climbed back to altitude to assess damage, the escorting B-57 bombers struck the enemy weapons sites. After determining that all aircraft were still operational, the spray planes made a run through the second valley, again encountering heavy fire and receiving additional hits. When the spraying was completed, the UC-123s again climbed to altitude to check damage. Finding no serious problems, the crews elected to finish the mission by making a pass through the third valley. Intense automatic weapons fire was encountered once more and all aircraft were hit, despite the efforts of the escorts who expended their remaining ordnance trying to protect the RANCH HAND flight. All aircraft were heavily damaged, but recovered safely to Da Nang; the three planes had been hit a total of twenty-two times.[30]

The major concentration of spray effort in October, however, was in the War Zone C and D areas; 206 of the 315 sorties were flown against III Corps targets. Here, too, increasing amounts of ground fire were met. The spray planes were hit 131 times in October and, on the last day of the month, RANCH HAND lost another UC-123. The mission was a routine defoliation run over the Iron Triangle and the three-plane formation was almost half-way through the target area when they encountered heavy automatic weapons fire. All three aircraft

were hit; Captain Roy Kubley's lead plane lost all electronics, radios, and hydraulic systems; number three had an engine shot out; but both made it back to Saigon. The number two aircraft was not so lucky. Hits in the left engine and propeller dome knocked out the engine and also prevented feathering of the propeller. It was impossible for the remaining engine to overcome the drag of the unfeathered dead engine and the aircraft crashed into the dense jungle within seconds after being hit. Viewing the wreckage from above, Kubley though it inconceivable "that anybody could live through it." Before losing its radios, the lead plane made an emergency call for fighter cover and rescue helicopters. Amazingly, when the two Air Force HH-43 "Huskie" helicopters arrived twenty-five minutes later, all three crewmen were found alive, suffering nothing more than cuts and bruises. At a "we survived" party at the Tan Son Nhut officers club that night, the men of the 12th consumed over seventy bottles of California champagne, celebrating the rugged dependability of the much abused assault transport they flew. Staff Sergeant "Junior" Winstead, who had been shot down twice within six months, told reporters: "This job isn't getting dangerous, its [sic] been dangerous."[31]

The number of missions continued to increase in November, but the number of hits declined abruptly, possibly due to a concentration of most sorties in "cooler" parts of War Zones C and D. Since these areas were close to Saigon, as many as twenty-nine sorties a day were flown. For the month, RANCH HAND made 409 flights, took only 51 hits, and dispensed 384,000 gallons of herbicides. Bad weather continued to plague the spray unit, as 182 sorties were cancelled.[32]

Aside from poor weather in upper South Vietnam, heavy scheduling in III Corps was partially due to Washington's decision to again test "the feasibility of clearing a typical Southeast Asia forest by the use of fire." Although previous fire projects in "Sherwood Forest" and the Chu Pong Mountains had failed, analyists called results "inconclusive." Planning for the new operation, code named "Pink Rose," began in May 1966. Two areas in War Zone C and one area in War Zone D, squares seven kilometers on a side, were selected. The plan was to defoliate the areas prior to the end of the growing season in

November, respray them at the beginning of the dry season in January, spray them again with desiccant (Blue herbicide) shortly before the burn trials, and then ignite the dried vegetation with incendiary bomblets dropped from Guam-based B-52 bombers. Targets A and B were defoliated with Orange herbicide, target C with White. Herbicide Blue application was at a normal three gallon-per-acre rate on targets A and C, with a one and one-half gallon rate on target B. Eventually, 255 sorties applied 255,000 gallons of herbicide to the selected areas.[33]

Target C, forty-five nautical miles northeast of Saigon, was struck first on 18 January 1967 by thirty B-52s dropping forty-two M-35 Incendiary Cluster Bombs each. The burning was ineffective; most fires spread no more than two feet from point of ignition. On 28 January 1967, target A, twelve nautical miles southwest of An Loc, was struck by the same number of B-52s, with nearly identical results. Target B, 16 nautical miles north-northwest of Tay Ninh, was bombed on 4 April 1967 by only fifteen B-52s, but the spacing was compressed to provide a bomblet density three times greater than the previous targets. The fires were slightly more effective, but the heat created a cumulus cloud that soared to over 50,000 feet altitude and dropped more than 1/2 inch of rain, extinguishing the fires. In its final report, Headquarters, Seventh Air Force, "concluded that the technique of a planned forest fire using this specific method is ineffective as an operational method for clearing forest area in South Vietnam."[34] After all the time and effort, the results were remarkably similar to those of the 1944 Army Air Forces tests in Florida.[35]

In November 1966, Lieutenant Colonel Robert Dennis became commander of the 12th ACS, and on the twenty-seventh, Secretary of State Rusk authorized defoliation operations in the southern half of the demilitarized zone. Moving day for the RANCH HANDs came four days later, on 1 December, as the squadron finally deployed to Bien Hoa. Continuing the RANCH HAND tradition for never doing things quietly, several crewmembers decided to make a production of their departure from Saigon. After take-off, three of the planes turned and, in a maneuver previously coordinated with the control tower, made a pass