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AIR WEATHER SERVICE SUPPORT TO THE UNITED STATES ARMY

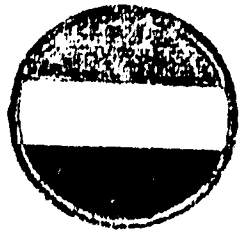
TET AND THE DECADE AFTER

AIR WEATHER SERVICE

AWS HISTORICAL STUDY NO. 8

Military Airlift Command
United States Air Force
Scott Air Force, Illinois

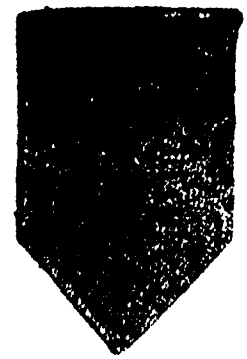
UNITED STATES ARMY FORCES COMMAND



101st Airborne Division (Air Assault)
"Screaming Eagles"

82d Airborne Division
"All American"

1st Infantry Division (Mechanized)
"The Big Red One"



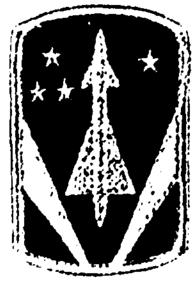
5th Special Forces Group (Airborne)

1st Cavalry Division
"The First Team"

7th Special Forces Group (Airborne)

2d Armored Division

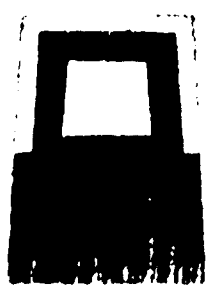
31st Air Defense Artillery Brigade



5th Infantry Division (Mechanized)
"Red Diamond Division"

3d Armored Cavalry
"Brave Rifles"

First United States Army



9th Infantry Division
"Old Reliables"

AIR WEATHER SERVICE SUPPORT TO THE UNITED STATES ARMY TET AND THE DECADE AFTER

Air Weather Service Historical Study No. 8

John F. Fuller

AWS Historian

August 1979

Reviewed by

Albert J. Kaehn, Jr.

Albert J. Kaehn, Jr. Brigadier General, USAF
Commander

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Scott Air Force Base
Illinois

The urgency to . . . go into the A Shau Valley was based on inches of rain to be expected after . . . April, not *ceilings* and *visibilities* which would prove so critical. In other words, the forecast monsoon rains (which did occur) never produced the terrible flying conditions of low ceilings and scud which preceded them in April. An air cavalry division can operate in and around the scattered monsoon storms and cope with the occasional heavy cloudbursts far better than it can operate in extremely low ceilings and fog . . . . The lesson learned, then, was that one must be very careful to pick the proper weather indices . . . for an airmobile operation. An inch of rain that falls in thirty minutes is not nearly as important as a tenth of an inch which falls as a light mist over 24 hours.

Tolson, *Airmobility: 1961 - 1971*

PREFACE

Over the years, successive editions of the Air Force directive spelling out Air Weather Service's (AWS) mission have specified that it tender meteorological support to the Air Force and the Army. Implied with the directive was that AWS' support be equitable between the Air Force and the Army. That it has not been so in the Army's case, particularly during the decade following the Tet offensive of 1968, is the subject of this study.

This work came about because of four factors: increasing attention focused by the AWS leadership in the 1970s to the problems of supporting the Army; increasingly difficult to parry evidence, which came to a head in 1977, that the problems were of such magnitude that AWS support to the Army was unsatisfactory; Brigadier General Rowe's dramatic reaction to the evidence, whereby he proposed sweeping his weathermen from the battlefield back to the corps level; and the fact that Air Weather Service historians over the past twenty years--present company included--gave scant attention in their official command histories to the vital mission of supporting the Army.

This work started out in mid-1978 as a subsection of the mission chapter for the 1977 Air Weather Service history. But the more I peeled back the veneer, the more it grew. Picking up the trail at the 1958 mile post, the last serious effort devoted by AWS historians to the subject,* and carrying it through 1977, it ballooned into a chapter--a big chapter. So big, in fact, and so encompassing, that my boss believed wider utilization could be made of it if published as a separate study. He asked that I finish the 1977 AWS history first, and then carry the coverage in this work through 1978 before going to press with it. I finished the final draft in August 1979. With it, a debt to the AWS historical function is canceled.

Without question the subject matter was the most perplexing I have ever tackled. Long since forgotten was anything I may have learned about the Army a quarter century ago as an Army ROTC cadet in my undergraduate days. Thus, I had to familiarize myself with the Army's organization and doctrine from the ground up, pre-Vietnam through the mid-1970s. In doing so, I soon discovered why people in AWS who have not been "brushed with brown" have a tendency to refer to Army weather support in generalities. To paraphrase Mr. Churchill, the subject of AWS support to the Army is an abysmal enigma inside a wrapper of mystery, all cloaked with intrigue. In short, it was an extremely complex subject, terribly difficult to get a handle on, and even more challenging to organize into what I hope is a coherent, flowing work.

Because of the subject's complexity, I will be forever grateful to five authorities on the subject who were generous enough to set aside their heavy workloads long enough to review all or selected portions of this study's draft. They were, alphabetically: Major Carl Chesley at Headquarters AWS, a former staff weather officer to the

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*AWS Historical Study No. 4, *History of Weather Support to the United States Army*, Dec58.

82d Airborne Division; Major Glenn McBride in war plans at Headquarters Military Airlift Command (MAC), who worked with the 101st Airborne Division in Vietnam in 1969; Lieutenant Colonel Dell McDonald, Glenn's boss, a graduate of the Command and General Staff College at Fort Leavenworth, who formerly served as AWS' liaison officer to CACDA; Lieutenant Colonel Chuck Swayne, the Army's liaison officer to Headquarters AWS, who had an extensive background in Intelligence, including a tour as the deputy Intelligence officer at III Corps and Fort Hood; and Major Tom Taylor from the MAC Inspector General shop who had served as the staff weather officer to the 1st Cavalry Division (Airmobile) in Vietnam. Tom helped keep me on track with my coverage of the 1968 Tet offensive. Carl responded rapidly on numerous occasions to my requests for documents, and volunteered several others of immense value to this study. Dell and Glenn offered words of encouragement when I needed them most. Chuck kept me attuned to the Army's viewpoint, and offered several suggestions which I incorporated.

My special thanks also to Tom Taylor and Colonel William Shivar for furnishing some of the pictures I used with the Vietnam coverage, and to Lieutenant Colonel Ernie Dash, and his special operations weathermen with the 3d Weather Squadron's Detachment 75 at Hurlburt Field, who gave me pictures of their activities which *Airman* magazine had featured in its May 1977 issue.

Then too, I want to thank the score of AWS officers and enlisted men who allowed me to pick their brains during telephone or in-person interviews, and answer questions that must have seemed inane. If this account is definitive, it is so thanks to the documentary gaps they willingly filled in the interest of finally seeing the entire story put to print in one book. Finally, I should not neglect Lieutenant General Tolson, the 63 year old former commander of the 1st Cav, now retired as a kindly southern gentleman in Raleigh, North Carolina, who took the time one morning to assure me over the telephone that the support he got from Tom Taylor and AWS during the heat of the Tet offensive was "damn good."

John F. Fuller
AWS Historian
4 August 1979

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Photo Credits

The Military Airlift Command historical office is indebted to various government agencies and individuals who took the pictures used in this history. They include: Aerospace Audio-visual Service, Air Weather Service, the United States Army, TSgts Dan Doherty and Phillip D. Henderson, Capt Thomas E. Taylor, Maj William H. Quelch, Jr, and Lt Col William H. Shivar of the USAF, and SP4 Franklin Mohler and SP5 Edgar Price of the U.S. Army. Unless otherwise indicated, all of the photographs used are USAF photographs.

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Maps, Tables & Charts

CHAPTER 1 - PRE VIETNAM

The Interim: Requirements, Doctrine, Field Tests

The war in Korea during the early 1950s was not too old before AWS weathermen supporting elements of the United States Eighth Army there ran afoul of problems similar to those faced in World War II. They did not receive adequate logistical support, and it was subsequently recommended that their needs be made an Army responsibility by including them in the Table of Organization and Equipment (TOEs) of the individual Army units supported. There was more interest in weather support by Army units at the front than by Headquarters Eighth Army, which was extremely vague about its requirements--although it asked for a five-day forecast, furnished eventually by the 30th Weather Squadron. "The Army had never expressed a desire for any but the most general type of weather forecasts, and its representatives had in fact, always shrugged off all attempts by the AWS to find out what they wanted in the way of an improved service," the AWS history for the period related; "the real trouble was that while the Army had to depend on the Air Force for its weather service, there was no one at Army Headquarters who knew enough of the technical aspects of the matter to be able to tell the Air Force what kind of weather service the Army needed." "The Eighth Army," the history concluded, "was not getting a service comparable to that being received by the Fifth Air Force."[1]

AWS in Korea, August 1950: because of North Korean advances, the 20th Weather Squadron detachment at Pohang (50 miles north of Pusan on Korea's southeast coast) prepares to evacuate. The weathermen had to travel 12 miles through sniper-infested countryside to reach the LST that took them to safety in the south. (USAF Photo)

Aware of that fact, the Army dispatched a team of experts to Korea to look into the quality of weather service received by the Eighth Army, and to study the problems associated with combat in winter. The five-man team reported that "there is a broad lack of environmental appreciation by the Army with the result that . . . environmental forecasting is not only far below the potential possible, but is largely unrecognized as of value."[2] Each successive echelon in the hierarchy of command thought it had prima facie need for weather support, but that the echelon immediately below it did not--i.e., the Eighth Army did not feel corps needed it, corps felt divisions did not need it, and so on. In fact, each echelon needed weather support. But the closer an Army unit was to the front, and the further away from an air strip, the worse the support. The team also saw a need for more weather observations at the front lines, and at regiment and battalion level.

Following the Korean War, in the mid and late 1950s, AWS and the Army made concerted efforts to improve weather support to ground forces. There was concern within AWS over efforts by elements within the Army Signal Corps to establish an independent Army Weather Service, but responsible Army officials were not favorably disposed to such an idea, preferring instead to rely upon AWS.[3]

A number of related problems needed resolution to improve weather service to the Army, but AWS focused its efforts on two key issues: to get the Army to formally state or list its requirements for weather service; and to revise and update the all-important joint regulation (Army Regulation 115-10/Air Force Regulation 105-3), spelling out Army weather support policy.

Under its basic mission regulation, Air Force Regulation 20-2 of April 1952, AWS was charged in general terms to tender meteorological service to the Army, as further delineated by the provisions of AR 115-10/AFR 105-3. In turn, the joint regulation was predicated upon one of over 200 roles-and-missions agreements reached by the Army and Air Force under the National Security Act of 1947 (which transferred the Air Force from the Army and established it as a separate branch of the military), whereby the Air Force was made responsible for the "provision of meteorological service to the Army, except Army meteorological ballistics data which will remain in the Army."[4]

A March 1949 version of the joint regulation was in effect in the 1950s, but was obsolete because of major organization, weapons systems, and tactics developments within the Army--e.g., the establishment of Continental Army Command (CONARC) at Fort Monroe, Virginia, in February 1955, the employment of surface-to-air missiles, and, in particular, the growth of "organic" Army aviation. Between 1955 and 1958, AWS and CONARC both forwarded draft revisions of the joint regulation through channels to the Air Staff and the Department of the Army for coordination and approval. But the Army's and Air Force's inability to resolve basic doctrinal differences precluded the publication of an updated joint regulation in the 1950s.[5]

In the absence of an updated joint regulation, a related manual and a regulation were published, in addition to which the Air Staff issued AWS some guidance in the matter of Army weather support.

In December 1956, Air Force Manual 105-6, *Weather Service for Military Agencies*, was published--the first formal treatise on AWS doctrine. It saw many of tactical air's jobs tied closely to support of ground forces and, therefore, addressed weather support in terms of both. It called for the establishment of a weather wing to support Air Force and Army components in each major theater of operations. Subordinate to the weather wing were weather groups for each tactical air command-army group team in theater. Immediately subordinate to each weather group was a weather center and two or more weather squadrons. The weather group headquarters and weather center were located with the headquarters of the tactical air command and army group. Weather squadrons were established to support--and be located with the headquarters of--each tactical air force-field army team. Each squadron had a weather center (responsible for forecasts for periods up to 48 hours), a weather station (detachment) at each tactical air force base and Army corps headquarters, and mobile weather observing teams as required. The corps weather station or detachment not only served the corps headquarters, but provided around-the-clock forecasting and observing service for divisions and other subordinate elements of the corps, including aviation units. But direct AWS support stopped at the corps level. Insofar as weather communications were concerned, the Air Force's Airways and Air Communications Service transmitted products from AWS' theater weather central (which prepared facsimile charts, and issued operational and planning forecasts for periods beyond 48 hours) to the corps' weather center and weather station; communications agencies of the field army and its subordinate elements "normally" provided facilities to collect weather data from elements of the field army (the meteorological sections of artillery units, for instance), and disseminated weather information directly related to ground operations. For administrative and logistical purposes, the corps weather station was "normally" attached to an Army unit and was dependent upon it for such support.[6]

In October 1957, in another first, AWS published a regulation (AWS Regulation 55-56) which specifically addressed procedures for tendering service to Army units. It specified that most Army units overseas and stateside would receive support from AWS detachments at the nearest Air Force base, regardless of the weather wing, group, or squadron to which the particular weather detachment was assigned. Little of the overall service AWS provided the Army was through AWS units on Army installations (fifteen by actual count, stateside and overseas, in August 1956), and even those were assigned to various weather squadrons, groups, or wings. In other words, Army units were supported by AWS on a geographical basis, while most major Air Force units were supported on a functional basis--and had been since AWS' first and only major reorganization, in 1952. The 2d Weather Group at Langley AFB, Virginia, which reported directly to Headquarters AWS and was the forerunner of the 5th Weather Wing activated in October 1965, supported CONARC--the staff weather officer to CONARC was assigned to Headquarters 2d Weather Group. Support of Army units in the Pacific and Europe was the responsibility of the 1st and 2d Weather Wings, respectively. Stateside, pending the assignment of full-time staff weather officers (programmed for mid-1960), limited staff weather officer assistance was provided the six numbered armies, III Corps and XVIII Airborne Corps, and the 101st Airborne Division by AWS detachment commanders from the nearest Air Force base. Weather wings and groups in the zone of interior with detachments supporting Army units kept the 2d Weather Group informed of the services furnished and any proposed changes. If the service asked for by a particular Army unit could not be met by the nearest AWS detachment, the Army unit was so notified and advised to submit its request for additional weather service through channels to the Department of the Army.[7]

Air Staff Guidance

Pending revision of the joint regulation, the Air Staff forwarded AWS some interim guidance a year later, in October 1958, regarding weather support to the Army. The Air Force was to provide, install, and maintain the weather equipment for AWS units on Army installations, and was to furnish the weather communications circuits necessary to connect Army installations with the nearest point of appropriate weather communications circuitry. The Army was to provide, install, and maintain the weather communications equipment at Army installations, and was to provide administrative and logistical services to AWS units involved in direct support of Army units.[8]

Informal Air Staff guidance in late 1958 indicated that the Air Force recognized, in principle, the general desirability of the Air Force's providing weather support to the Army. However, the desirability had to be equated with the availability of manpower and facilities. Army requests for weather service which required additional people or facilities would have to be submitted to the Air Staff, who would then request AWS to evaluate them. Any time the satisfaction of additional Army requirements was expected to jeopardize Air Force interests, the Army would be accorded the option of transferring Army manpower spaces to the Air Force to meet those requirements, or requesting a redeployment of previously allocated Army weather support facilities. Air Force weather facilities would be established at Army installations only after the Army agreed to furnish the specified communications, logistics, and administrative support. Observing equipment provided and used by AWS units serving Army installations would be compatible with tactical deployment considerations and the performance characteristics of airlift aircraft; the Army could provide alternative observing equipment if it wished.[9]

Provisions that the Army transfer spaces to the Air Force for Army weather support, and AWS evaluate Army requirements, were major shifts in Air Staff policy. Until then, the AWS leadership had been in favor of transferring Army spaces to the Air Force to meet expanding Army weather support requirements, but the Air Staff had been hesitant to do so for fear the Army might reciprocate in such areas as air base defense and Corps of Engineers support. But AWS was advised in 1958 that some top level Air Staff officials were opposed to continuing weather support to the Army, thus the provision for doing so on a "desirability" basis. The Air Staff opinion in 1958 was that the Air Force was not actually obliged to provide the service, and could cancel it any time it became desirable to do so--that was, any time the provision of weather support to the Army diverted Air Force manpower to an extent that Air Force interests were jeopardized.[10]

The crux of the matter was that, in August 1956, after a great deal of urging by the Air Force, the Army finally forwarded the Air Force its first formal and comprehensive statement of requirements for weather service since 1946. It was followed by other formal requirements set forth by the Army in 1958 and again in 1959.[11] The problem with the Army requirements was that they equated to additional Air Force (AWS) manpower--well over 400 manpower spaces as opposed to some 200 AWS spaces (about 2.3 percent of the 8,452 weather officer, warrant officer, enlisted, and civilian spaces authorized AWS) devoted exclusively to Army support stateside and overseas in August 1956.[12]

A key development along those lines was the activation of the 7th Weather Squadron at Heidelberg Army Installation, Germany, and the 16th Weather Squadron at Fort Monroe in early 1959. It was a major functional organizational alignment in that they were the first two weather squadrons in AWS' history activated for exclusive support of the Army. The Air Staff approved their formation, but would not provide the needed manpower spaces. They were taken from existing AWS authorizations at a time when Air Force requirements for meteorological services were also growing.[13]

AR 115-10/AFR 105-3, 1962

The Air Force policy statements and directives were helpful to AWS, but they carried little influence in Army circles. In addition to the joint regulation, the document which governed the Army's approach to weather support stateside was CONARC Regulation 115-1, published in March 1961. It defined "direct" support as that provided by AWS people or units having a primary mission of Army support, normally located with the supported Army unit; "remote" service was that provided by AWS personnel or units whose secondary mission was Army support, usually by electronic means. The Air Force was to provide, install, and maintain the fixed meteorological equipment (the Army would furnish the necessary foundations, power, cabling, etc.) needed by AWS units in direct support of the Army; provide weather communications circuits required to connect those AWS units with the nearest point of long-line weather communications circuitry; and provide meteorological supplies peculiar to the operation of those AWS units which were unavailable in Army supply channels. During joint maneuvers and exercises, the Air Force was to furnish weather communications circuits to connect the tactical weather station at the highest Army echelon to long-line weather communications circuitry; the Army would provide the needed terminal communications equipment and expendables, and would provide the weather communications circuits from the highest Army level to lower echelons. On post or in garrison, the Army would furnish direct support AWS units with terminal weather communications equipment to include teletype, facsimile, recording, and dissemination gear. The Army would also provide administrative and logistical support to the direct weather support units similar to that normally afforded any attached unit of comparable size and activity, to include facilities and common supply items.[14]

The primary document, however, which influenced the Army and the Air Force in weather support affairs, was the joint regulation. AWS had already sent its first cadre of people to the war in Vietnam before the 1949 version of AR 115-10/AFR 105-3 was superseded with a new version, dated 23 March 1962, and it remained in effect until 1970.

The 1962 version tied up some loose threads, but the wording of sections addressing key issues was of sufficient ambiguity to permit an interpretation favorable to the Army or AWS, depending upon one's interest or persuasion, or the circumstance at the time. In the revision, for example, in a concession to AWS' wishes, the Army's requirements for direct peacetime weather support were specifically outlined. Further, it specified that the Army review and rejustify those requirements to the Air Force each three months. For wartime requirements, all Army contingency or war plans requiring AWS support were to include a weather support appendix to the intelligence annex.[15]

A significant loophole was woven into the section of the joint regulation discussing responsibilities and organization. The Army would meet its own requirements in the following areas: observations and upper-air soundings in support of artillery; specialized meteorological support to Army research and development activities; Chemical-Biological-Radiological (CBR) and river stage/flood forecasting; and weather observations forward of division--*except* that, and hence the loophole, "this will not exclude placing Air Force weather personnel in the forward area when required by appropriate plans or circumstances." AWS observing support would go as low in echelon as the division, but *could* legally be extended lower. Otherwise the Air Force, through AWS, would provide or arrange for all Army weather support.

The typical AWS organizational structure for support of a field army, as outlined in the joint regulation, called for a weather squadron (its headquarters manned by 5 officers and 7 enlisted men, supported by a detachment with a complement of 5 officers and 36 enlisted men) with the field army headquarters, and weather detachments (manned by 4 officers and 19 enlisted men at corps level, and one officer and 5 enlisted men at division level) at each subordinate corps *and* division headquarters--each weather unit at each of those echelons consisting of complete forecasting, observing, and staff support sections.[16]

The staff weather officer provided by AWS at all Army echelons came under the operational control of the Army commander, and under the staff supervision of the organization's Intelligence officer; but he was to be free to coordinate weather matters directly with the commander and other staff agencies. Staff weather officers assisted their Army units in determining weather service requirements, but the unit's Intelligence officer was to formally state and forward them. The Intelligence officer was also responsible for "disseminating processed weather information . . . to appropriate command elements," and for "coordinating Army personnel weather training requirements" with the unit's operations section. The Army was to provide weather observers for artillery meteorological sections, and personnel to take "necessary forward area or other specialized weather observations."[17]

In the area of logistics support, the Air Force would procure, install, and maintain the weather equipment needed by AWS units, while the Army would "furnish logistical support to Air Force units equitable with that furnished to Army units of comparable size and activity"--to include vehicle maintenance, supply items, field clothing and equipment, and mess facilities.[18]

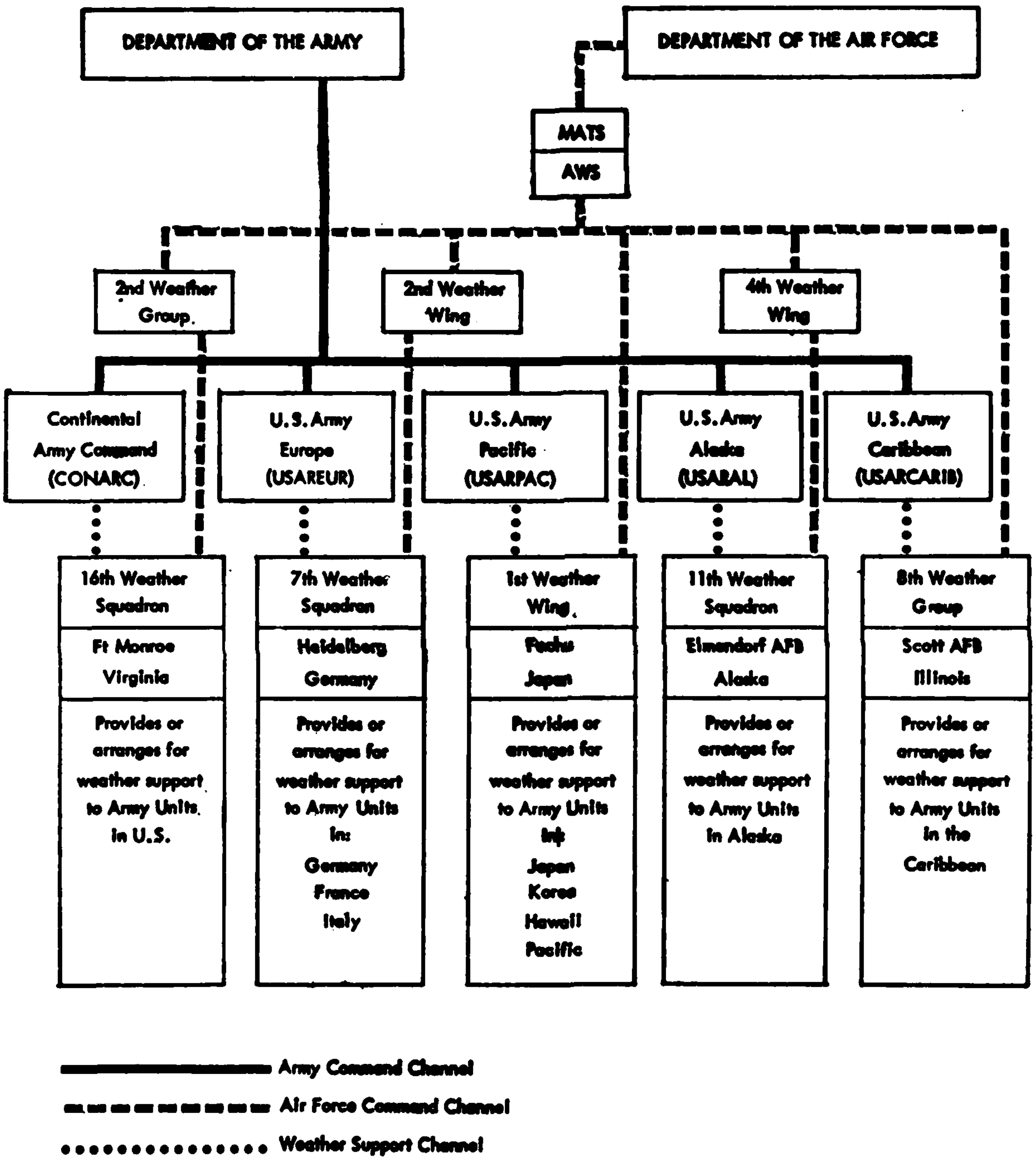
A key section of the joint regulation addressed weather communications. In essence, the Air Force would provide long-line communications circuits to AWS units on Army installations, while the Army would "provide main-frame terminations, on-post circuitry and terminal communication equipment including installation, maintenance, and other local services necessary for operation of all weather communications facilities on Army installations." In the field, during "exercises or operations," the Air Force would furnish mobile weather communications support to the field army level, and the Army would furnish it below that level--i.e., corps level and below. The Army would also provide and maintain the necessary facilities for disseminating weather information to Army users.[19]

The communications section of the joint regulation was changed in May 1965 to specify that the Air Force provide long-line communications to Army posts where AWS detachments were located, *as well as* provide, install, and maintain associated terminal weather communications equipment. At Army posts without AWS detachments, the Air Force would provide for long-line circuits, but the Army would take care of the rest. Responsibilities for disseminating weather information, and for weather communications support in the field, were not changed from the 1962 version.[20]

It was in 1965 also that the Air Force published another major document on AWS doctrine, a successor to Air Force Manual 105-6 discussed above. In a section devoted to weather support of tactical Army forces, Air Force Manual 2-31, *Aerospace Environmental Operations*, of December 1965, provided latitude for AWS to furnish observing support below division level, addressed AWS' centralization concepts for the battlefield, but did not tackle the all-important questions of how AWS weathermen in the field would be supported from a communications standpoint or logistically.[21]

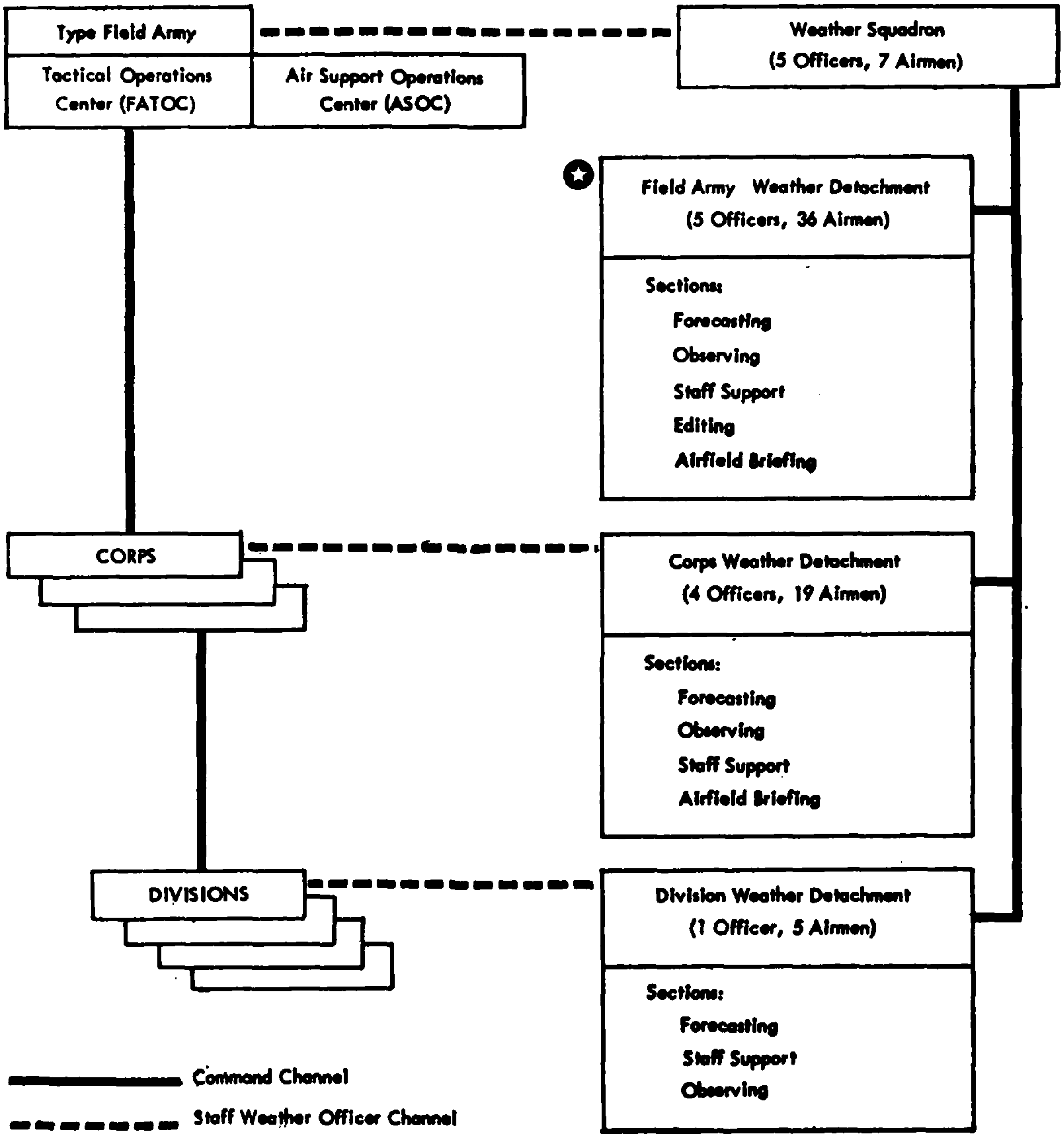
March 1962

CURRENT ARMY WEATHER SUPPORT ORGANIZATION



March 1962

TYPE FIELD ARMY WEATHER SUPPORT ORGANIZATION



Serves as basic weather facility for squadron commander and other weather personnel supporting ASOC, FATOC, and Field Army air strip.

Swift Strike III, 1963

The concepts, policy, and doctrine regarding the Army's weather support requirements, as espoused by the Air Force and Army directives discussed above, were routinely tested in the field during Army maneuvers held each year, or during joint exercises. But with the publication of the revised joint regulation in March 1962, the Army and AWS conducted a special evaluation of AWS' capabilities to support Army corps and divisions in the field in a tactical situation. The test was conducted during exercise Swift Strike III in August 1963, in the Fort Bragg, North Carolina, area and South Carolina, and looked specifically at AWS support to the XVIII Airborne Corps, commanded by General William C. Westmoreland, and its 82d and 101st Airborne Divisions. It directly involved some 165 AWS personnel. Objectives of the test included evaluating such areas as: AWS' manning levels; Army requirements for weather service; weather observations from organic Army units (excluding artillery); Army meteorological and non-meteorological logistical and administrative support to AWS units under the joint regulation and appropriate division and corps TOEs; and the adequacy of tactical Army communications provided AWS units at corps and division levels.

The results of the Swift Strike III test surfaced problems in tendering weather support to the Army that, by then, had become traditional in nature--a way of life for pragmatists in the Army weather support business. Shortcomings cropped up in communications, logistical support, and in the utilization and the combat or field training of AWS people. XVIII Airborne Corps priorities assigned to AWS' people and gear were so low that it was late in the twelve-day exercise before they were airlifted to the objective area. Some designated weather elements were not moved at all. The result: limited weather support. It made little difference. The weather was ideal. Corps and division officials therefore did not begin to use or tax the limited weather support capability available, and it was recommended that the number of people assigned to both corps and division weather teams be cut. No Army units provided surface observations, and no Pilot Reports (PIREP) were received from Army crews. Administrative support by the Army was acceptable, but non-meteorological logistical support "ranged from very poor to excellent, *depending on the availability of the items and the persistence and dogged determination of the weather personnel to obtain them* [author's italics]."[22] Logistical support to AWS units could not be fully evaluated because the equipment required in changes to TOEs had not been received at the corps and divisions. Even then, corps and division Standard Operating Procedure (SOP) did not provide for administrative and logistical support of AWS weather teams. Communications were totally inadequate--some authorized TOE equipment was unavailable, and substitutes were inadequate; power sources were unreliable, causing excessive teletype outages; alternate power sources were authorized weather teams at corps level but not at division; back-up tactical communications were overloaded and use of them caused delays so that the perishable weather data was obsolete before it could be delivered to those needing it; communications between division airfields and the division command posts was unreliable (the radios authorized--AN/PRC-9--by appropriate TOEs did not have enough range); common-use telephone circuits were either out of commission or overloaded; and one sole-user weather communication circuit between the corps and division weather teams was commandeered for operational use. Vehicles were either not provided or did not run. Some AWS personnel were not proficient in taking surface and upper-air observations under field conditions.

In summary, the Swift Strike III test report concluded in general that more reliable weather communications was required below corps level, all authorized TOE equipment must be available, and AWS people needed more field training.[23]

CHAPTER 2 - THE TET OFFENSIVE, 1968

Background

The ground war fought in Vietnam in the 1960s and early 1970s differed from most other major wars the Army was involved in in the Twentieth Century in that the conventional use of division-sized units or larger gave way to seesaw warfare featuring smaller elements, platoons and squads, and the individual soldier--the "dogface," the "grunt." It lacked well-defined battle lines characteristic of most conventional conflicts. Commanders on both sides were unable to trace neatly drawn lines of battle on daily situation maps; unable to point to the unique symbols of Army hieroglyphics denoting corps flanked by corps, division flanked by division along a "front." All of the Republic of Vietnam was a "front," vulnerable to attack. Few areas were secure. Some were controlled by the "friendlies" by day--or--season--and by the "unfriendlies" by night. Such factors as political constraints, terrain, and the nature of the enemy's doctrine contributed to the difference, but the fact remained that the ground war was fought by units of battalion size or smaller rather than by divisions. It was characterized for the most part by isolated skirmish or ambush, rather than by huge "frontal" assaults. The ubiquitous enemy seldom marshalled large forces for sustained periods, preferring instead to concentrate small forces in widely dispersed areas to attain local superiority. The tactics of the inimical forces were mostly hit and run; ambush, strike, and retreat. The enemy could be a farmer by day and a soldier by night, uniformed or non-uniformed, armed or unarmed. Fought during the second generation of the Atomic Age, it was a strange war that featured crude booby traps and snares and bamboo punji sticks on the one hand, and sophisticated electro-optical weaponry and earth-orbiting satellites on the other.[1]

The basic concept employed by the Army to counter the enemy in the Republic of Vietnam was airmobility. Fundamentally, being airmobile meant that a division's "maneuver" elements were capable of being airlifted to selected battle areas, generally by helicopters. Their resupply, reinforcement and, if need be, withdrawal, were also accomplished by both fixed-wing aircraft and helicopters organic--assigned permanently--to the division. Enough aircraft and helicopters were assigned to permit the simultaneous airlift and employment of about a third of an airmobile division.[2]

The test case of the airmobility concept in combat was the deployment of the 1st Cavalry Division (Airmobile) and its 440 helicopters to the Republic of Vietnam in the summer and early fall of 1965. The test was considered a success by the Army and, as a result, all divisions subsequently deployed to the theater conducted search-and-destroy, or clear-and-secure operations using the airmobile concept.[3] Air mobile operations in Vietnam revolutionized Army tactics.

By July 1966, in addition to the 1st Cavalry Division (Airmobile) and an airborne brigade already there, the United States had committed to service in the Republic of Vietnam the 1st and 25th Infantry Divisions, the 1st Brigade of the 101st Airborne Division, and the 1st and 3d Marine Divisions. They represented 51 maneuver battalions, 38 combat support battalions, and 30 construction battalions. During fiscal

1966 Army units engaged in over 350 battalion-sized or larger operations, making contact with the enemy 290 times; the enemy was encountered over 1,650 times in company-size or smaller unit operations. To support those operations, the overall Army helicopter inventory rose by over 1,200, to some 5,500, by mid-1966, and there were more helicopters in Vietnam than any other type aircraft.[4]

The heart of Army airmobility in 'Nam. (USAF Photo)

When the 1st Cavalry Division (Airmobile) arrived in the Republic of Vietnam, its original plan was to operate with the division headquarters at a main base, An Khe, and the three brigades dispersed to different air strips. The brigades would move from strip to strip every five or six days because intelligence estimated that it took the enemy that long to marshal forces and materiel for an operation. After its arrival, however, the division decided to locate both its headquarters and the three brigades at An Khe permanently. For each engagement, one or more of the brigades and an advanced headquarters were moved to the field for the period of the operation. Conversely, the 25th Infantry Division changed its mode of operation after arriving in theater to that originally used by the 1st Cavalry Division (Airmobile).[5]

Organizationally, by mid-1966, most Army units in the Republic of Vietnam were under United States Army Vietnam (USARV), which was the equivalent of a field army and acted as the Army component of the United States Military Assistance Command, Vietnam (USMACV). Under USARV were two corps-level units, identified as I Field Force and II Field Force, each responsible for specific geographical areas.[6]

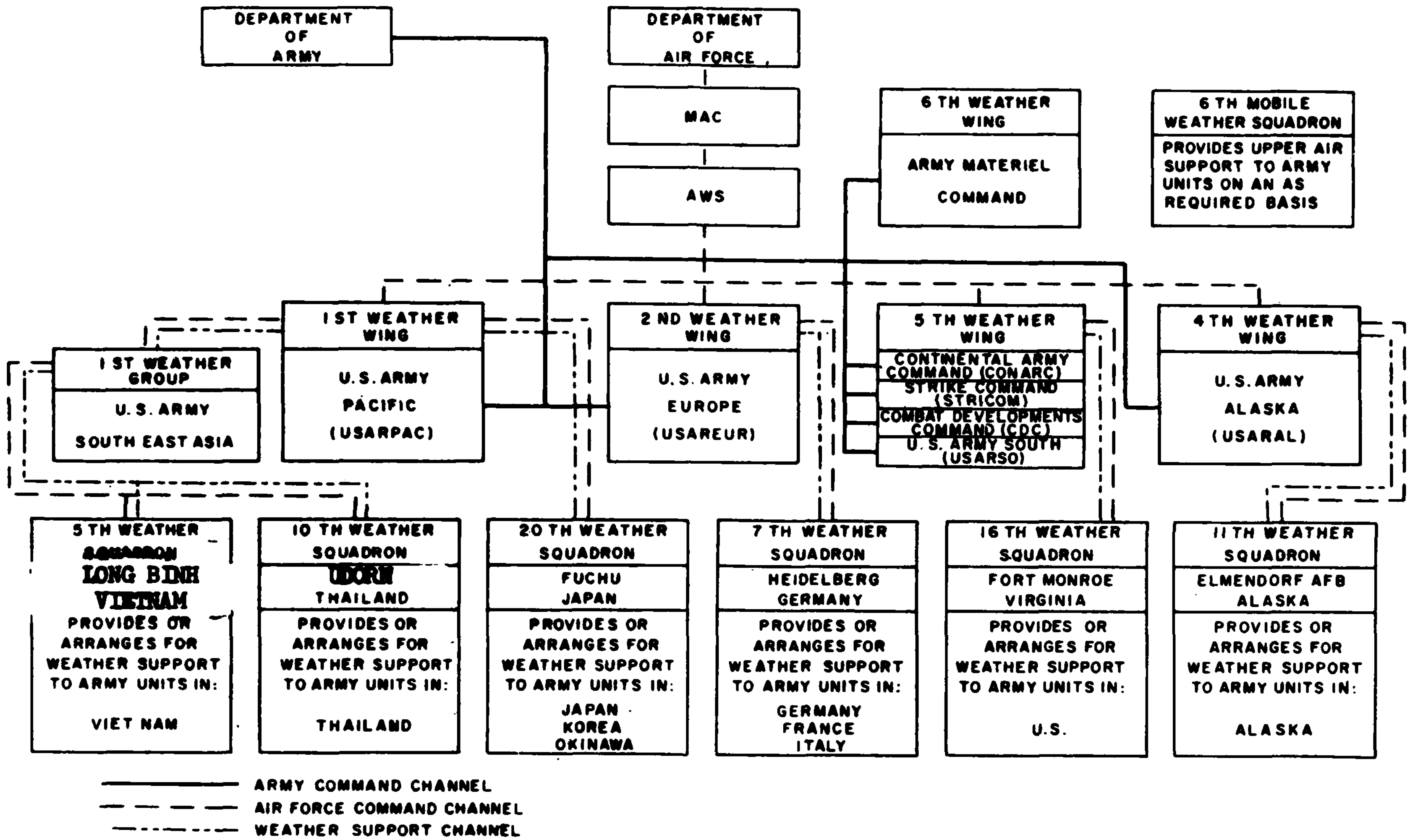
To support USMACV's forces in Southeast Asia, AWS established a weather support group--the 1st Weather Group--and three subordinate weather squadrons in theater in mid-1966. The mission of two of the squadrons, the 10th and the 30th, respectively located in Thailand and

Vietnam, was to support Seventh Air Force units.

The mission of the other squadron, 5th Weather Squadron, was to support USARV and its various elements. The commander of the 1st Weather Group acted as staff weather officer to USMACV while the 5th Weather Squadron commander served as staff weather officer to USARV through the G-2 (Intelligence) staff section. A detachment subordinate to the 1st Weather Group, Detachment 14, located with the Headquarters Seventh Air Force at Tan Son Nhut Air Base, served as the theater weather center and prepared centralized products and area forecasts for use by units of all three weather squadrons. Beneath the 5th Weather Squadron were seven weather detachments, basically, one each with Headquarters I and II Field Forces, and one at each of five permanent Army airfields in Vietnam that operated independently of either field force. The airfield detachments were typical base weather stations. Subordinate to each of the two detachments at the field force--corps--level were five or six operating locations whose missions were to support divisions and, in some instances, independent brigades or regiments. Although not formally designated units, three-man weather observing teams from the division weather unit were attached to each brigade. Thus, AWS people were located with Army troops at all echelons from the field army, corps, and division level; and observing service was furnished at division and brigade level routinely, and in some instances to regiments. Essentially, AWS' organization structure for support of the Army in the Republic of Vietnam remained as described, although with the introduction of the XXIV Corps in 1968, a separate 5th Weather Squadron detachment was activated to support it.[7]

United States force levels in Southeast Asia reached their zenith in 1969 when about a half-million were in theater, of which some 94,000 were Air Force personnel, and 349,000 were Army. At that time AWS had about 680 personnel in Southeast Asia, of which some 180--about 26 percent--were assigned with the 5th Weather Squadron in the Republic of Vietnam for support of the Army.[8]

After a year of tests as an air assault unit, the 1st Cavalry Division (Airmobile) was formally activated at Fort Benning, Georgia, on 1 July 1965. Before it shipped to the Republic of Vietnam in 1965, the Army submitted a formal statement of requirements asking for twenty AWS weathermen--four forecasters and sixteen observers--to support the division in theater. Misunderstandings over the requirement delayed its staffing. Then there was a weather manpower ceiling in Vietnam to be dealt with which, when coupled with inherent lags in the personnel system, meant that permanently assigned weathermen were not identified in time to accompany the new division when it shipped in August. Reservations were made by the division for the twenty weathermen aboard ship, but the 16th Weather Squadron was only able to send three people with it on temporary duty--an officer (lieutenant) and two enlisted men. They had received no combat training, and they arrived in Vietnam sans weather equipment and field gear. The balance of the manpower support the division needed was scavenged from AWS personnel assigned permanently in theater. Because the ranking AWS officer insisted that the weathermen receive some combat training before going into action, it was mid-November 1965 before the first weather observing teams deployed forward with the division's brigades in offensive operations. Single sideband and FM radios furnished the teams were ineffective because of their limited range and the hilly terrain between the brigades and the division headquarters. Consequently, the weather observations were never received back at An Khe. The division also brought a weather teletype with it to An Khe. It was December 1965 before Army Signal Corps personnel could get it working.[9]

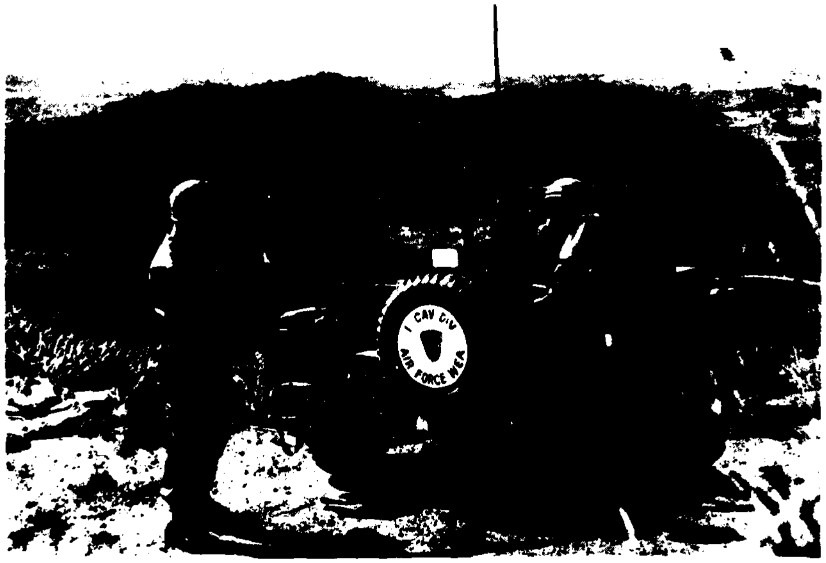


AWS Army Support Structure

1969

A short while later, when the 4th Infantry Division arrived in Vietnam, it asked for staff weather officer service to its headquarters, 24-hour observing and forecasting service for its command post, and observing service at its airfield. AWS did not have enough people readily available. Its base weather station at Fort Lewis, Washington--the division's former home--found that its workload did not subside after the division deployed because its manpower authorizations were not based on supporting the division. Thus AWS was forced to

Men of the 4th Infantry Division at Fort Lewis checking out a 4.2-inch mortar. (USAF Photo)



Reading the sling psychrometer and passing humidity data back to the base camp in support of the 1st Cavalry Division (Airmobile), 1969. (USAF Photo) meet the division's requirements with people rushed in temporarily until a formal statement of requirements was processed through channels, spaces allocated by the Air Staff, and weathermen stateside were selected and reassigned to the theater. "The most important lesson the Air Weather Service has learned from the Vietnam conflict," wrote the AWS chief of staff in 1968, "is that in order to properly support US Army ground operations in combat, a weather support unit must be in being, fully trained, and capable of being deployed with the Army tactical unit when it deploys."[10]

Operations

Under its airmobile concept, the Army was heavily dependent upon air support, not only helicopters and fixed-wing aircraft for airlifting troops into and out of the battle area, but on close air tactical support. Weather often hamstrung air activity and in many instances the Army's ground operations had to be cancelled because air support could not be delivered. There were repeated instances where Air Force tactical aircraft flew in extremely hazardous weather to support Army units under attack, but the Army generally found that close air support was not as responsive in bad weather as artillery.

Nor were the Army's helicopters immune to Vietnam's weather. They could not operate in zero-ceiling and zero-visibility conditions. The crew had to see the target. Helicopter gunships were not equipped to deliver ordnance through clouds or heavy haze. As long as there were 500-to-1,000 foot ceilings or visibility, the gunship pilots could acquire the target and deliver ordnance. AH-1G Cobra helicopters were most effective if the firing pass began at 1,500 feet or above, with target engagement at between 500 and 1,500 feet. The UH-1B/C Iroquois helicopter gunships operated better at a lower altitude. Whatever, poor weather drove helicopter gunships to lower levels where they were more vulnerable to enemy ground fire.

The battles of 1966 which follow, as well as the highly publicized Tet offensive of 1968, were selected for discussion because they are representative of the effect weather had on ground operations throughout the imbroglio of the Vietnam war, as well as the nature of the support the weathermen of AWS tendered the Army in combat. It is not to suggest that the effects of weather support and weather did not vary from battle to battle, unit to unit, area to area, season to season, and from year to year. They did. But the weather communications problems experienced with the 1st Cavalry Division (Airmobile) in November 1965 (in particular communications between the division main base and weather observer teams deployed with brigades), for instance, became a fact of life right up to the 1973 ceasefire. And the weather that forced the 1st Infantry Division commander, Major General DePuy, to terminate operation Birmingham prematurely in 1966, was no different from the protective canopy of adverse weather that permitted the enemy to hang onto Hue in 1968 twice as long as necessary (had there been blue skies), or the low cloud ceilings and visibilities that shielded the North Vietnamese invasion of Quang Tri Province in the spring of 1972--despite the fact that there were a host of battles in the intervening years upon which weather and weather support were negligible factors.

Looked at in some depth below, therefore, are the weather and weather support aspects of the battles at Hue, Khe Sanh, and the A Shau Valley during the communist Tet offensive of 1968. Tet was significant because at no time beforehand in the prolonged conflict, and only once thereafter (the spring 1972 invasion of Quang Tri Province), did the enemy marshal so many forces for so long on so broad a front. It was a major change in his strategy. He selected the time of his attack to coincide with the adverse northeast monsoon weather and the relaxed alert posture the South Vietnamese forces would be in during the traditional Tet holidays. Acknowledged is the fact that there were other battles than those covered below, that the resilient communists generated a second so-called "mini" Tet offensive early that same summer, and that at every juncture they were beaten back and suffered heavy losses. Yet while the Tet offensive represented a dreadful drubbing militarily for the communists, it was eclipsed by the fact that it was *the* most significant event of the war because the enemy's resoluteness and resiliency crumbled the American will to continue the protracted war. The Tet offensive of 1968 was the iceberg that spelled the beginning of the end for the *Titanic* that was the American presence in Southeast Asia.

Operations Masher and Jim Bowie of 1966 are cursorily looked at below, not only because the 1st Cavalry Division (Airmobile) was the embodiment of the Army's neophyte airmobile concept, and hence a favored son, but its combat record was unmatched by any other Army division in that war. Its commanders and staffs throughout its tour in the theater seemed to harbor a greater appreciation for how weather could hurt them, and how weather support could offset or minimize weather's adverse effects on airmobile operations. And cameos of operations Birmingham and Attleboro are offered because the 1st Infantry Division commander, Major General DePuy, was so impressed with the weather support he received, that he did not forget it a decade later when, as a full general commanding TRADOC, he was in a position to influence the outcome of the bedrock issue for AWS of whether its support to divisions should be direct or indirect.

1966

Operation Masher

Operation Masher involved the 2d and 3d Brigades of the 1st Cavalry Division (Airmobile), and commenced when the latter brigade began search-and-destroy operations in late January 1966 on the coastal plain and adjacent hills immediately north of Bong Son in the Republic of Vietnam. On 3 February, the 2d Brigade moved from the division's main base at An Khe to Bong Son. The following day it established an advanced command post twenty miles north, but left its assigned AWS weathermen at Bong Son. Located in hilly terrain, the command post became enveloped with persistent fog. The situation soon prompted the brigade's Intelligence officer to state emphatically, "I want my weather team up here now!" [11] A CH-47 Chinook helicopter was immediately dispatched to pick up the weathermen. On arrival the observers radioed back that the command post was located on the downwind side of a hill at the base of an orographic cloud, thus explaining the inclement weather.

Later, portions of the 2d Brigade moved into the Kim Song Valley and operated from there for ten days. The valley was highly susceptible to intensive fog, and observations by the weathermen deployed with the brigade were invaluable in preparing weather forecasts for the area. The Intelligence officer was reported to have said later that he would never again operate without his weathermen at his side. It was also believed to have been the first time during that war that AWS had a complete weather forecasting element deployed forward with an Army unit.

Operation Jim Bowie

The 1st Brigade of the 1st Cavalry Division (Airmobile) was scheduled to begin a search-and-destroy mission in rugged, mountainous terrain twenty-five miles northeast of An Khe on 10 March 1966. The operation was codenamed Jim Bowie. It was to be an airmobile affair because the entire area was inaccessible by roads. Operation Jim Bowie was delayed for three consecutive days because of adverse weather in the landing zone--conditions accurately forecast by the division's staff weather officer, Captain Charles E. Hill, who was subsequently awarded the Air Medal for his efforts.[12]

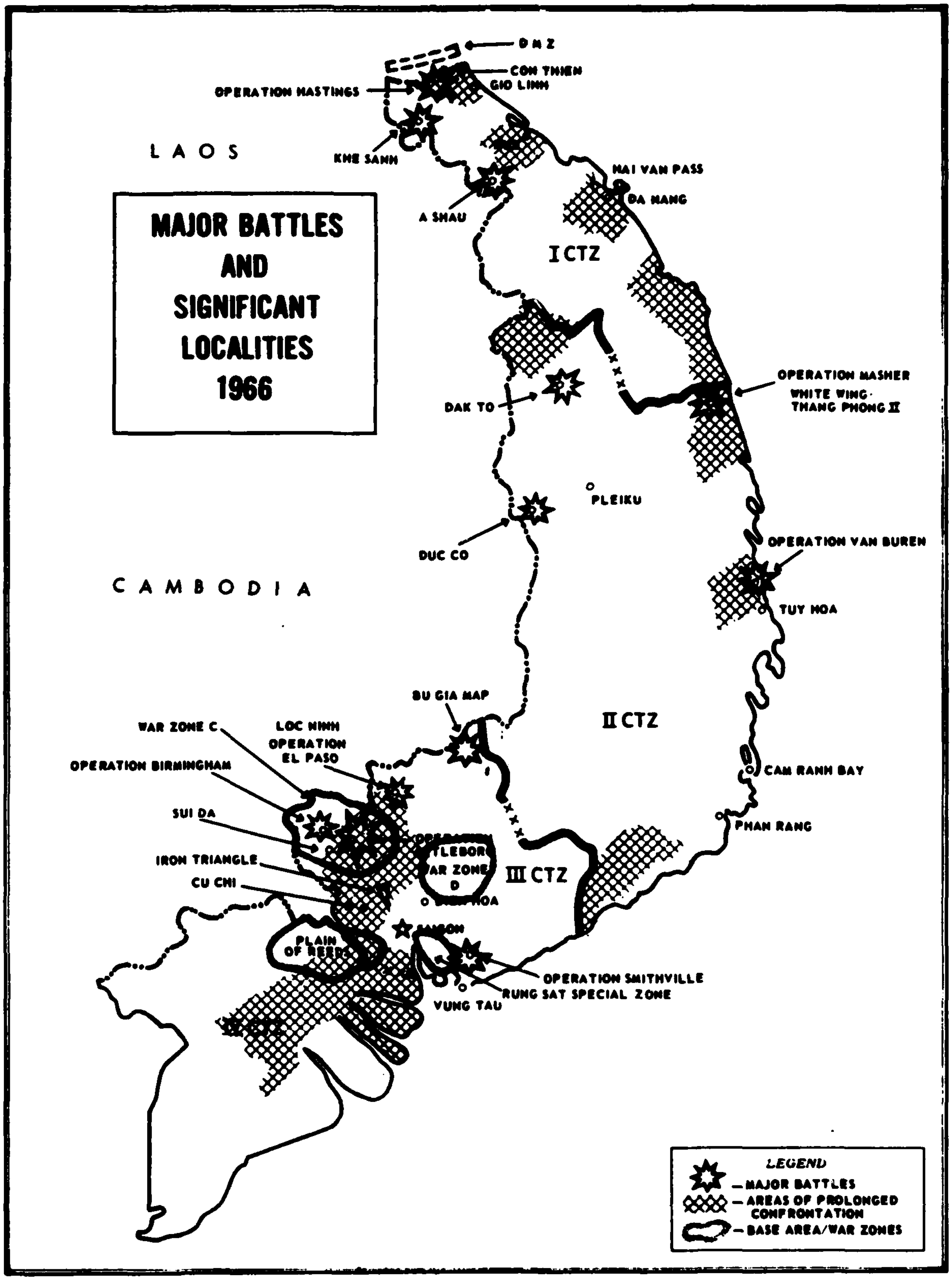
The operation finally commenced on 13 March. Two days later, two AWS enlisted weather observers were airlifted to the brigade's command post atop a 2,600-foot ridge. The terrain was so steep and rugged that two 500-gallon fuel bladders and a 105-millimeter howitzer were lost when their tethers broke and they rolled downhill. The two weathermen dug protective trenches around their pup tent to keep from rolling downhill while asleep. The final phase of the operation ended on 28 March.

Operation Birmingham

In late April 1966, AWS' staff weather officer to General William C. Westmoreland, briefed the USMACV commander on expected weather during a forthcoming operation codenamed Birmingham. It was another search-and-destroy mission conducted along the Cambodian border in Tay Ninh Province by various brigades of the 1st Infantry Division, the "Big Red One." It was the first major Allied foray into that enemy stronghold since 1962. It began on 24 April with an assault airlift made with Air Force C-130s. From then until 7 May, weather was not a factor in aerial support, although the extreme heat and high humidities reportedly caused heat prostration in approximately sixty percent of the troops. In the first six days of that operation, due to poor communications, only seventeen of the ninety-two weather observations taken with brigades forward reached the parent weather detachment with the division headquarters at Phu Loi.

SSgt Kenneth R. Wolfe reading anemometer at Tay Ninh airstrip in preparation for arrival of C-130s during operation Birmingham. (USAF Photo)

On 7 May, the weather detachment commander, who was the division's staff weather


MAJOR BATTLES
AND
SIGNIFICANT
LOCALITIES
1966
DMZ
CON THIEN
GIO LINH
OPERATION HASTINGS
LAOS
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OPERATION SMITHVILLE
RUNG SAT SPECIAL ZONE
VUNG TAU
LEGEND
— MAJOR BATTLES
— AREAS OF PROLONGED CONFRONTATION
— BASE AREA/WAR ZONES

officer, was asked by the division Intelligence officer to go immediately to a nearby site from where a brigade was to be airlifted by helicopter into the battle area the following day. After one battalion from the brigade was airlifted, the weather officer briefed the division commander, Major General William E. DePuy, that heavy rain would blanket the landing zone for approximately two hours. The airlift was halted. Nearly two hours later, with the rain still falling as forecast, DePuy decided to extract the battalion already deployed as quickly as possible because he could not reinforce it if it got into trouble. The battalion was subsequently successfully moved, and Operation Birmingham terminated on 16 May.[13]

Operation Attleboro

On 4 November 1966, the 1st Infantry Division deployed to support elements of the 25th Infantry Division engaged in heavy fighting with the Viet Cong 9th Division near Dau Tieng. Some 22,000 American and Allied troops were employed in what was the largest battle to that time. The Viet Cong were eventually pincered and the operation, codenamed Attleboro, was reportedly the most successful to date in the area northwest of Bien Hoa in terms of Viet Cong losses in men (over 1,100 killed), materiel, and base camps. The value of the weather support tendered to the operation was underscored by the fact that, in a reportedly "unprecedented" act, General DePuy approved the award of the Bronze Star Medal to all eighteen members of the 5th Weather Squadron units supporting his division at Phu Loi for "exceptionally fine weather support" during Attleboro.[14]

Of note also was that many of the men from that weather unit--and others supporting the Army--had qualified as door gunners in Army helicopter gunships. In addition to their normal duties as observers and forecasters, many of the men volunteered to fly special weather reconnaissance missions in light Army aircraft and helicopters to obtain on-the-spot information on operationally significant weather. Since a non-fighting observer on many of the missions was a luxury, the weathermen qualified as door gunners. Despite the fact that AWS authorities officially frowned on such extra-curricular activities, they generally looked the other way; and, in fact, had a hand in writing the justification for the Air Medals won by several of the door-gunner weathermen from the unit supporting General DePuy's 1st Infantry Division.

1968: The Tet Offensive

Following Allied successes in Vietnam in 1967, North Vietnam decided to change its strategy from guerrilla warfare and small unit actions to the use of major forces, according to General Westmoreland. All North Vietnamese forces that could be marshalled were moved south for a major offensive in 1968. It concentrated first in the Saigon area, and secondly, in the area immediately south of the demilitarized zone near the Seventeenth Parallel. North Vietnam's objective, to the general's way of thinking, was to create a public uprising, to precipitate mass defections among South Vietnamese forces, and to effect de facto partition in the Republic of Vietnam--particularly in the two northern-most provinces, which North Vietnam hoped to seize by force and there set up a liberation government.[15] The offensive was timed to coincide with the poor weather of the northeast monsoon, and with the traditional Vietnamese Tet celebration ushering in the lunar new year--29 January 1968 was new year's eve and it, together with new year's day and the following day, were the most important of a week-long holiday.

Hue

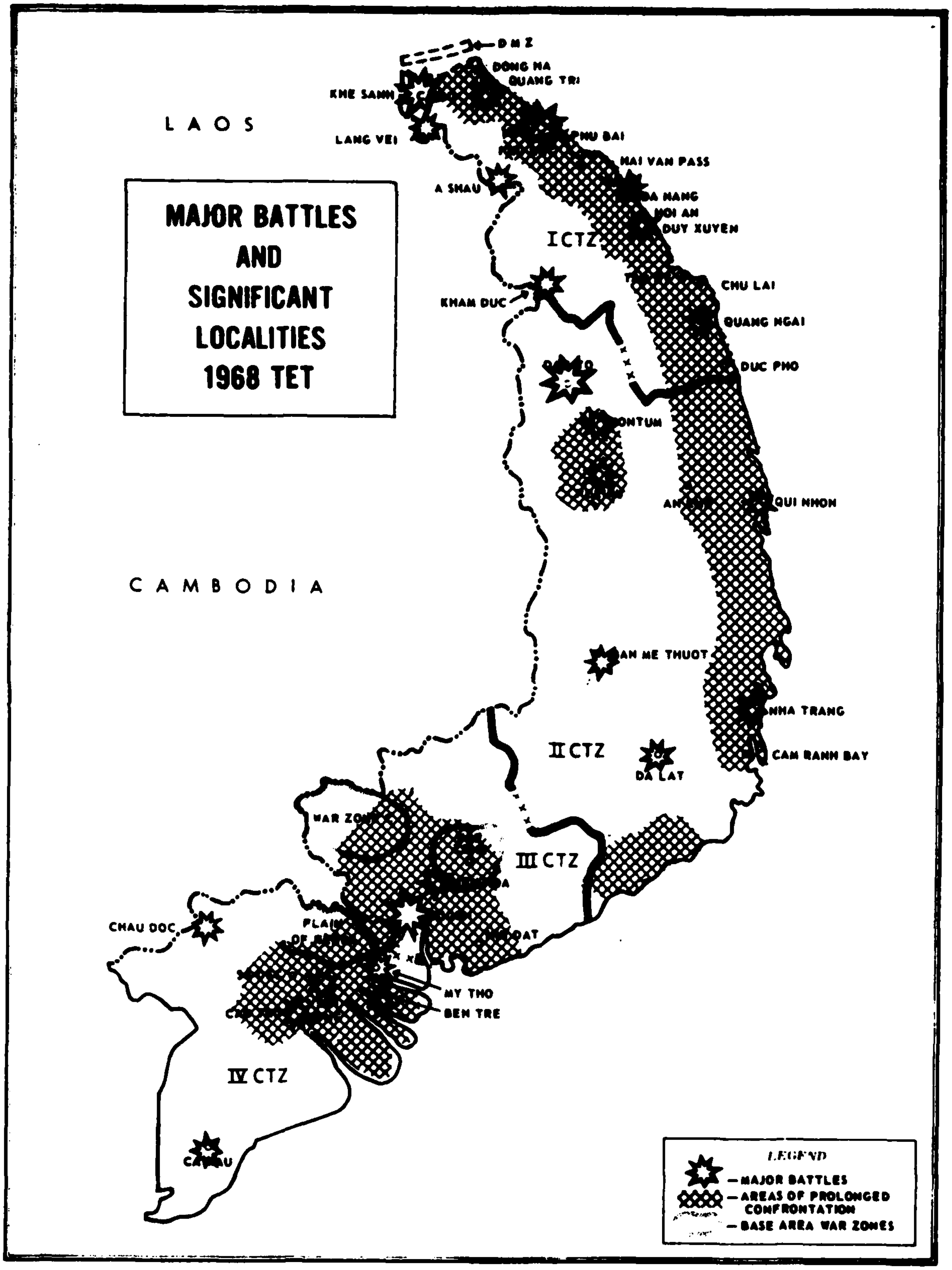
On the evening of 30-31 January 1968, the communist Tet offensive began with attacks on a hundred places from the demilitarized zone to the Mekong Delta and the Ca Mau Peninsula. No target was too big or too impossible. In regular North Vietnam Army uniforms, and in the characteristic black peasant pajamas worn by the Viet Cong, the enemy struck at nearly forty major towns and cities. In their largest offensive to date, about 84,000 of the 200,000 North Vietnamese and Viet Cong troops south of the Seventeenth Parallel attacked thirty-six of the forty-four provincial capitals in the Republic of Vietnam, including Hue.[16]

Hue, the ancient imperial capital of Vietnam, populated by 140,000 inhabitants,was the third largest city in the Republic of Vietnam. It was situated 100 kilometers south of the demilitarized zcne, some ten kilometers in from the coast. Employing seven-to-ten battalions, the enemy carefully selected the time of his attack. In addition to the fact that most military units were at reduced strength because of the Tet holidays, the weather favored the attackers. Under concealment of low fog, enemy regular units comprised of Viet Cong and North Vietnamese troops, were able to infiltrate the city with the help of accomplices inside. By daybreak, 31 January, the enemy controlled all but the city's northern corner. In addition, Hue was isolated. The enemy cut Highway 1 from the Hue-Phu Bai area south to Da Nang.[17]

United States military operations in the northern provinces of the Republic of Vietnam came under control of the III Marine Amphibious Force--the equivalent of a corps--commanded by Lieutenant General Robert E. Cushman, Jr. His principal ground units were the 1st and 3d Marine Divisions, headquartered, respectively, at Da Nang and Dong Ha. Anticipating the enemy offensive, General Westmoreland decided to reinforce Cushman by moving in some 45,000 United States Army troops--about the strength of a corps. Included were the headquarters and two brigades of the 1st Cavalry Division (Airmobile), under command of Major General John J. Tolson, III, and elements of the 101st Airborne Division. The 1st Brigade of Tolson's division bivouacked near Quang Tri, and his 3d Brigade was between Quang Tri and Hue. In late January 1968, Tolson's headquarters moved from An Khe to Camp Evans, fifteen kilometers south of Quang Tri near Phong Dien. One battalion of the 101st moved by air to Phu Bai, and another moved by sea to Da Nang, before the division headquarters moved in early March 1968 to Camp Eagle, between Hue and Phu Bai, about a mile off Highway 1.[18]

Action was taken immediately to relieve the pressure on Hue. Three Marine and eleven South Vietnamese battalions, accompanied eventually by four battalions from the 1st Cavalry Division (Airmobile), became involved. Some of the most furious combat of the war ensued--much of it house-to-house fighting reminiscent of World War II battles. Aided by atrocious weather, the enemy shuttled in reinforcements to the point where, before the battle ended, some sixteen North Vietnamese battalions were identified in and around Hue.

During the early hours of the battle, the weather was reasonably good; but 2 February proved to be a turning point, and weather conditions thereafter became increasingly worse. Temperatures fell into


MAJOR BATTLES AND SIGNIFICANT LOCALITIES 1968 TET
LAOS
CAMBODIA
DMZ
DONG HA
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KHE SANH
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PHU BAI
HAI VAN PASS
A SHAU
DA NANG
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DUY XUYEN
ICTZ
CHU LAI
KHAM DUC
QUANG NGAI
DUC PHO
KONTUM
QUI NHON
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MY THO
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IV CTZ
LEGEND
MAJOR BATTLES
AREAS OF PROLONGED CONFRONTATION
BASE AREA WAR ZONES

the fifties--unseasonably cool for there. The prevalent misty drizzle occasionally turned into a cold drenching rain. As clouds closed in and heavy ground fog developed, it became difficult to use heavy fire support properly. Tactical air operations were hamstrung. The majority of fire support missions fell to the howitzer batteries and ships offshore. Although less restricted by poor visibility than aircraft, artillery fire had to be precise. Even then the forward ground observers were occasionally required to radio corrections to firing batteries based on sound rather than sight.[19]

While cloud ceilings were generally 150-to-200 feet at best, Major General Tolson nevertheless claimed that his helicopters kept airlifting troops close to the assault positions, even if they were unable to make actual air assaults. "Air strikes were very difficult to call in because of the bad weather and low ceilings," he later wrote; "most of our helicopter operations were at an altitude of about 25 feet." "I think it was at this time," he continued, "that General Creighton W. Abrams [the deputy USMACV commander who replaced General Westmoreland at mid year] said that any previous doubts that he had had about the ability of the helicopter to fly in marginal weather were removed."[20]

Bitter fighting continued at Hue until 25 February 1968, when the last enemy position was overrun. The Marines lost 142 killed; the South Vietnamese 384. Some 5,000 enemy soldiers were killed within the city and another 3,000 in the environs. Loss of life among the civilian population was heavy--about 5,800. More than 2,800 of those were found later in single or mass graves--many of them victims (due to their official positions or loyalty to the Saigon government) of a systematic purge by the communists during the twenty-six days they occupied the city.[21] General Cushman estimated afterward that with a break in the weather, the battle for Hue could have been fought and won in half the time.[22]

Khe Sanh

Key to the northern provinces in the Republic of Vietnam was Khe Sanh. It was a remote and isolated outpost off Highway 9 held primarily by a reinforced regiment of United States Marines. With its capture, North Vietnam would possess an almost unobstructed invasion route through the A Shau Valley to the northern provinces. They then could outflank American positions.

On 21 January 1968, the North Vietnamese unleashed a heavy rocket, artillery, and mortar attack on Khe Sanh, and began assaulting its outlying defenses. Anticipating the attack, General Westmoreland, backed by the Joint Chiefs of Staff, chose to make a stand for strategic and psychological reasons, believing the Marines could be sustained by air power.[23]

General Westmoreland made his decision knowing full well that, as he phrased it, "we were in the midst of the northeast monsoon with no prospect of relief from bad weather until the end of March"; and that "poor visibility . . . because of low clouds and persistent ground fog, made helicopter movement hazardous if not impossible much of the time" and "posed major problems for close air support and supply by air."[24] "The weather at Khe Sanh," he wrote,[25]

> was of some concern. The mists, low-lying fogs, and drizzling rains of the *crachin* last from October through April, and Khe Sanh is on the dividing line between the *crachin* and generally clear weather that prevails during the same period over the Ho

Chi Minh Trail in Laos. While taking advantage of the weather in Laos, our aircraft would be handicapped at Khe Sanh, but B-52s, artillery, and tactical aircraft bombing by radar could make up for much of the disadvantage. The weather actually provided another argument for holding Khe Sanh--to prevent the enemy from taking advantage of the *crachin* and infiltrating the populated coastal region as he did in going through the A Shau Valley to Hue.

Because Highway 9 to Khe Sanh had been cut by the enemy since August 1967, the most valuable piece of real estate to the besieged defenders at Khe Sanh was their 3,900-foot airstrip. Some 1,500 feet above sea level, it was surrounded by mountains towering 5,581 feet on the north, and an average of 3,000 feet in other directions. A ravine off the runway's east end dropped about 800 feet. It acted as a trough. Through it the prevailing winds channeled warm, moist air to the cooler airstrip causing a virtual "fog factory" during the northeast monsoon.[26]

Climatology furnished General Westmoreland's staff by the 1st Weather Group indicated that ceilings below 2,000 feet and visibilities less than 2.5 miles could be expected at Khe Sanh on more than half the mornings through April; conditions at mid-day would typically improve, with average ceilings in the early afternoon rising to about 3,000 feet.

The data proved reasonably accurate for the siege at Khe Sanh, except that conditions in February were far worse. For any one day the best weather during the siege lasted only six hours, when clouds were in a scattered-to-broken condition between 1,000 and 2,500 feet. Visibilities were never much better than five miles. In the early morning, afternoons, and late evening weather and fog reduced visibilities to less than a mile.[27]

Under cover of the heavy fog, some audacious North Vietnamese gun crews positioned their antiaircraft weapons just off the runway's eastern end and fired in the blind whenever they heard the drone of incoming aircraft. Several planes were hit while on final approach and completely in the fog.

On those occasions when the sun finally managed to burn through, cloud ceilings raised slightly but still hovered low enough to prevent the unrestricted use of airborne artillery spotters and strike aircraft. It was during those periods, when the overcast was between 100 and 500 feet, that enemy artillery, rocket, and mortar fire was heaviest. The North Vietnamese forward observers, perched along the lower slopes of the surrounding hills, called in and adjusted barrages with little fear of retaliation against their own gun positions. Later in the afternoon, when the fog rolled in again and obscured the enemy's view, the incoming fire tapered off.[28]

The Marines adjusted their schedule accordingly. They usually worked under the cover of haze in the morning, went underground during the midday shelling, and returned to their duties later in the afternoon. While the extremely low cloud cover occasionally befriended the men at the base, it constantly plagued pilots whose mission it was to resupply them. Weather greatly affected helicopters also. When the "choppers" were grounded, life became hard on the Marines manning the perimeter. One period of weather when they could not fly persisted for nine days. Such a water shortage developed that one small position was authorized to conduct a two-hour march to obtain water from the nearest stream. The patrol surprised a group of enemy soldiers and killed many of them in a firefight.[29]

During the siege of Khe Sanh, Air Force C-130s and C-123s airlifted nearly 11,000 tons of "beans, bullets, and bandages" to the 6,680 Marines, and moved 3,387 troops or other passengers in or out.[30] But stocks were never seriously depleted because, out of respect for the weather, a twenty-day supply of all essential items had been laid in. Yet, more could have been done had not fog kept the runway closed about forty percent of the time.

With the transition in monsoon seasons in March 1968 the weather at Khe Sanh gradually began breaking up. General Westmoreland ordered the 1st Cavalry Division (Airmobile) to reopen Highway 9--reasonably secure in the knowledge that tactical air support could keep the North Vietnamese at bay with better weather. He was anxious to re-establish ground contact with the Marines yet, as he wrote, "a study of weather in the region over the preceding ten years revealed that not until about the first of April could I count on good weather for airmobile operations."[31]

Preparations for the relief of Khe Sanh, an operation codenamed Pegasus (or Lam Son 207A) got underway in late January, but it was 1 April 1968 before the drive kicked off. The bad weather that day lingered to taunt the Army for the week it took to reach Khe Sanh.

To do the job, Major General Tolson had nearly 500 helicopters and 19,000 men from his 1st Cavalry Division (Airmobile), plus 10,000 Marines and three South Vietnamese battalions--some 30,000 troops in all. The operation launched from Landing Zone Stud, a forward operating base with a bunker complex and 1,500-foot airstrip eleven miles northeast of Khe Sanh near Ca Lu. Seldom were Tolson's helicopters able to begin operations before 1 p.m. because of the weather. "Good weather," Tolson wrote, "was considered to be any condition where the ceilings were above 500 feet and the slant range visibility was more than a mile and a half."[32]

Ground fog, haze, and low hanging clouds were a way of life during Pegasus. Still, enemy resistance was light and contact with the defenders at Khe Sanh was first made on 6 April. Two days later the relief of Khe Sanh was effected, although operation Pegasus did not officially terminate until 15 April 1968. Tolson's forces suffered 983 casualties, including 125 killed, while the retreating North Vietnamese left behind 1,304 dead on the battlefield. Summarizing Pegasus, Tolson wrote later that,[33]

> for the first time, the [1st] Cavalry [Division (Airmobile)] had made an air assault as a division entity; every committed battalion came into combat by helicopter. In fifteen days, the division had entered the area of operations, defeated the enemy, relieved Khe Sanh, and been extracted from the assault--only to assault again four days later into the heart of the North Vietnamese Army's bastion in the A Shau Valley.

With the relief of Khe Sanh, the two and one-half month siege came to an end. American casualties during the period were light: 199 killed and 1,600 wounded. Best available estimates were that the communists suffered in excess of 10,000 casualties.[34]

Writing later, General Westmoreland added an interesting postscript to the effort and resources expended at Khe Sanh in 1968. He was reassigned at mid-year and one of the first actions taken by his

Maj Gen Tolson (center) conferring over map at LZ Stud. (U.S. Army Photo)

Loading 1st Cavalry Division (Airmobile) helicopters at LZ Stud for relief of Khe Sanh. (Photos by Capt Taylor) successor as USMACV commander, General Abrams, was to abandon Khe Sanh. Four years later, when the North Vietnamese invaded Quang Tri Province in the spring of 1972, the South Vietnamese had nobody at Khe Sanh, and the valleys leading down from the Khe Sanh plateau, into the populated coastal regions eastward provided convenient avenues for the invaders.[35]

A Shau Valley

As Major General Tolson noted, General Westmoreland approved a plan for the 1st Cavalry Division (Airmobile) to immediately turn south from Khe Sanh and join with the 101st Airborne Division for a drive into the A Shau Valley.

Abutted against South Vietnam's border with Laos, the valley was situated between two mountain ranges with peaks rising over 1,000 meters. Three abandoned airfields lay on its floor, which ran northwest to southeast. North Vietnamese forces had been in control of the valley since overrunning a Special Forces camp on the southern end in March 1966. In the interim they had constructed a major logistics base for infiltrating people and supplies from North Vietnam into South Vietnam's northern provinces. The object of the A Shau Valley operation, codenamed Delaware (or Lam Son 216), was to prevent the enemy from massing to launch further attacks in the vicinity of Hue.

On 10 April 1968, without warning, Tolson was ordered to immediately begin plans for extracting his division from Khe Sanh and prepare for a helicopter assault ("reconnaissance in force") on the A Shau Valley. The sense of urgency was predicated upon a long-range forecast prepared by the 1st Weather Group's Detachment 14 (the weather center) which indicated that a short period in April held out the last possible time for weather favoring an assault operation in the valley before the onset of heavy monsoon rains.[36]

The operations plan for the A Shau Valley operation was published on 16 April. D-day was tentatively set for the seventeenth. However, Major General Tolson determined that D-day would be contingent on having three continuous days of favorable weather in the valley for some of his helicopters to perform reconnaissance for selecting flight routes, pinpointing enemy antiaircraft and artillery positions, and developing targets for tactical air and B-52 strikes. "They rushed us in because of weather," Tolson remarked later, and it was "a very important part of our discussion" on the operation.[37] By the sixteenth Tolson had not had the three days of good weather so his recommendation that D-day be slipped to the nineteenth was approved.[38]

On 19 April 1968, in the wake of extensive artillery fire and B-52 bombing, operation Delaware kicked off with the initial air assault by two brigades of the 1st Cavalry Division (Airmobile) and a South Vietnamese infantry regiment. Despite the preparatory fire, enemy antiaircraft fire was intense.

During the first few days of operation Delaware the weather was worse than forecast. It was characterized by low cloud ceilings, fog, and thunderstorms. Coupled with heavy enemy antiaircraft fire, "the unbelievably bad" weather, as Major General Tolson described it, made helicopter assaults and Air Force C-130 resupply missions extremely hazardous.[39] The weather was not only bad in the A Shau Valley but at the launch base, Camp Evans, as well. It forced helicopter pilots to climb up through the overcast on instruments, reassemble a formation on top of the clouds, fly to the target area, and then search for a hole in the clouds to make a descent. "What should have been a simple twenty-minute flight was usually an hour and twenty minutes of stark terror," Tolson wrote; "the operation was a phenomenal piece of flying, but from a commander's viewpoint it was sheer agony to see what my people had to go through to accomplish the mission."[40]

C-130 pilots faced the same problems but, unlike the helicopters, generally could not pick holes in the clouds for their descents. They were vectored to the A Shau Valley by the intersection of radials from two radio stations on the Vietnam coast. From there they began an instrument approach into the valley for the air drops. On-board radars were used to avoid the mountains. "No matter how reliable the gauges," noted Tolson, "it takes a lot of guts to poke your airplane nose into clouds that are full of solid rock!"[41] Not all were successful. On 26 April a C-130 took antiaircraft fire after breaking out of the overcast too far south of a landing zone in the valley. Attempting to crash land, and losing altitude rapidly, it came under more small arms fire, crashed and burned. When the weather was good, the operation progressed; when it was bad, the campaign lagged.

With a general improvement in the weather conditions on 22 April, the 1st Cavalry Division (Airmobile)'s two brigades were able to consolidate and improve their positions in the A Shau Valley. Enemy resistence lessened as the buildup of Allied forces continued through the end of the month. By 3 May, C-130s were able to land on one of the valley's three airstrips, A Luoi airfield, where Major General Tolson moved his division's forward command post. During the next few days many major enemy supply depots were uncovered, and a partial list of captured equipment included a tank, three track vehicles, 67 wheeled vehicles, 137,757 rounds of small arms ammunition, 1,680 hand grenades, and 2,500 individual weapons.[42]

With all major objectives achieved, the problem then became one of extracting troops from the A Shau Valley before the monsoon rains became too intense. In many ways extraction proved more difficult than the assault. Rain washed out enough of the A Luoi airstrip to halt C-130 traffic, so all of the men and supplies were airlifted out by Army helicopters. Extraction began on 10 May and Delaware was officially terminated on 17 May 1968.[43]

The enemy suffered 839 casualties during the A Shau Valley campaign.[44] According to Major General Tolson, the 1st Cavalry Division (Airmobile) lost 21 helicopters in the operation;[45] according to Major Peter N. Micale, who was the 5th Weather Squadron operations officer at the time, the Army lost 33 helicopters during Delaware (roughly seven percent of the number possessed by Tolson's division), primarily because low cloud ceilings increased their vulnerability to 12.7 millimeter antiaircraft fire.[46]

Major General Tolson, a paladin of the Army's airmobility concepts and doctrine being tested by fire in Vietnam, delved unusually long on the weather and weather support aspects of the A Shau Valley campaign. "While the 1st Cavalry Division lost twenty-one helicopters in this operation," he wrote in 1973,[47]

> the fact that they were able to make a major move into such an area in the face of this [antiaircraft] threat and under the worst possible weather conditions is a tribute of the soundness of the airmobile concept. Some of the helicopters that were lost ignored clear warnings of intense enemy concentrations that had been uncovered by prior reconnaissance. At times the weather

gave an additional aid to the enemy by channelling helicopters into certain flight paths to go underneath the clouds. The enemy, of course, adjusted his fire to the obvious approaches.

. . . .

From the Allied point of view, Operation Delaware brought out one important consideration. Weather had been the key planning factor on the timing of this operation from the beginning. The urgency to terminate Operation Pegasus in order to go into the A Shau Valley was based on inches of rain to be expected after the month of April, not *ceilings* and *visibilities* which would prove so critical. In other words, the forecast monsoon rains (which did occur) never produced the terrible flying conditions of low ceilings and scud which preceded them in April. An air cavalry division can operate in and around the scattered monsoon storms and cope with the occasional heavy cloudbursts far better than it can operate in extremely low ceilings and fog. The monsoon rains did, in fact, wash out the hastily constructed [A Luoi] airfield but our capability for airmobile operations improved during the period. *The lesson learned, then, was that one must be very careful to pick the proper weather indices in selecting an appropriate time for an airmobile operation* [author's italics]. An inch of rain that falls in thirty minutes is not nearly as important as a tenth of an inch which falls as a light mist over 24 hours. According to the long range forecast based on old French records, April was supposed to have been the best month for weather in the A Shau Valley. As it turned out, May would have been a far better month--but you don't win them all.

Notwithstanding the helicopter's weather limitations, Army authorities were convinced it had once more proved indispensible during the Tet offensive. Referring to the relief of Khe Sanh and the A Shau Valley campaign, General Westmoreland proclaimed that "American forces achieved a degree of co-ordination and sophistication with flexibility and mobility of airmobile warfare never before known."[48] "The helicopter was the work horse of the Vietnam War," Westmoreland's one time deputy for operations concluded; "despite the helicopter's sensitivity to weather conditions, its versatility gave it great value in combat operations."[49]

The Results

By mid-February the communist Tet offensive of 1968 began petering out, a fortnight after it began, and by 1 April, with the thrust to reopen Highway 9 to Khe Sanh, the initiative shifted and Allied forces throughout the Republic of Vietnam moved to the offensive. "In the main," General Westmoreland wrote, "the Tet offensive was a Vietnamese fight," and the South Vietnamese withstood the burden well.[50]

Between 29 January and 11 February 1968, the communists lost 32,000 killed and 5,800 captured--nearly half of the 84,000 committed to their offensive. The Americans lost 1,001 killed; South Vietnamese and Allied forces 2,082. By the end of February, as Allied forces swept the environs of the towns and cities, the enemy death toll rose to 37,000--a loss in one month of more men than the United States had lost since 1961. During the first six months of 1968, the communists lost an estimated 120,000 men--over one-half of their strength at the beginning of the year, and enough to man more than twelve communist divisions. In the same interval the ratio of enemy to Allied casualties was about 5.6-to-one.[51] By the close of 1968, when the United States had dropped more tons of bombs on Vietnam than fell on Germany and Japan in World War II, American casualties exceeded 30,000 dead and 100,000 wounded.

Militarily and politically the Tet offensive of 1968 was a major setback for the communists in the Republic of Vietnam. President Lyndon B. Johnson, who with his closest advisors followed the Tet offensive's developments on a daily--sometimes hourly--basis, labeled it a North Vietnamese debacle, and "by any standard a military defeat of massive proportions."[52] Allied forces quickly stemmed the tide and, for the most part, Viet Cong and North Vietnamese elements turned tail to go lick their wounds. Politically, the expected uprising among the South Vietnamese failed to materialize. On the contrary, the people rallied to the Saigon government, and the Tet offensive became not a Dien Bien Phu but, as General Westmoreland assessed it, a Pearl Harbor.[53]

However, while the North Vietnamese suffered military defeat in Vietnam, they won a resounding psychological victory in the United States by undermining American will to continue the fight--much as they had the French after Dien Bien Phu fourteen years earlier. "By demonstrating that after years of effort the United States and South Vietnam could not even safeguard Saigon, the Tet offensive shook the faith in [President] Johnson's policy," concluded three of the nation's preeminent historians who, in a textbook used as a primer in classrooms across the country, tagged it "the Vietnam quagmire."[54] On 31 March 1968, in yet another attempt to get Hanoi to negotiate a ceasefire in Southeast Asia, President Johnson announced his decision to suspend the bombing of North Vietnam north of the Twentieth Parallel--as well as his decision not seek re-election that year.[55] * Richard M. Nixon won the November election, one of his campaign promises being to end American involvement in Southeast Asia. Thus, at places like Saigon, Hue, and Khe Sanh in 1968 the communists sowed seeds of discontent and disillusionment in the field of American public opinion--fertilized by the generally pessimistic reporting of the fourth estate--that eventually grew into the abandonment of South Vietnam under a misnomered "peace with honor."

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*While the president was reaching his decision, Secretary of State Dean Rusk pointed out to him that, by limiting air strikes in North Vietnam to targets south of the Twentieth Parallel, the United States would not be making a major military concession because the monsoon weather would pretty well hamstring attacks in the Hanoi-Haiphong area anyway. (Johnson, *The Vantage Point*, pp. 399-400.)

General William W. Momyer, whose Seventh Air Force conducted the bombing, knew that North Vietnam's weather would probably be poor for another month, during April 1968, but then would improve markedly during the southwest monsoon. "Thus, although I had no confidence that we could achieve a negotiated settlement at that time," Momyer wrote, "I supported the proposal for a bombing halt because I realized that the weather alone would probably cause us to cancel all but a few hundred sorties and because we were not being permitted to strike the most valuable targets in any case." Momyer believed that a cessation of bombing north of the Twentieth Parallel during April would have minimum effect on his air campaign; but, if North Vietnam displayed no intention to de-escalate the war in South Vietnam, he advocated a resumption of bombing with no restrictions, and the mining of Haiphong harbor. See Momyer, *Air Power in Three Wars*, p. 27.

The Weather Support

The initial scope and intensity of the communist Tet offensive of 1968 prompted General Westmoreland and other American authorities to try various means to neutralize weather's impediments or turn them to advantage. With the aid of ground radars, B-52s were able to bomb the Khe Sanh perimeter areas through solid cloud cover; and tactical airlift aircraft were able to get close enough to the Khe Sanh runway to release their loads on target, without landing, in weather that proved a blessing because it forced enemy antiaircraft batteries to fire in the blind. To help detect the enemy's movement, seismic and acoustic sensors were implanted around Khe Sanh, and gravel munitions--both noisemaker and a variety powerful enough to wound a man or puncture a truck tire--were carefully laid in patterns designed to filter enemy traffic through the sensor fields. Still, weather, in particular warm fog, was a hindrance, and efforts to disperse warm fog at Khe Sanh by dropping salt from C-123s out of Da Nang on fifteen different missions were a failure--as AWS experts had warned anxious theater decision makers they would be.[56]

Rainmaking

The weather modification efforts at Khe Sanh during the Tet offensive were conducted in extreme secrecy, as were efforts by AWS at rainmaking--or rainfall enhancement or augmentation, as the purists and orthodox within AWS preferred referring to it.

In 1967, based on tests conducted by the Defense Department and the Navy over Laos the previous year, AWS was assigned three WC-130s specifically for conducting rainmaking operations over portions of the Ho Chi Minh Trail winding from North Vietnam through Laos and Cambodia into South Vietnam. The theory went that, if the normal monsoon season (particularly the southwest monsoon) could be extended, the resultant mud from increased rainfall on the main lines of communication from North Vietnam would measurably reduce the flow of men and materiel to the enemy.[57]

The WC-130s and crews utilized were assigned permanently to AWS' 54th Weather Reconnaissance Squadron at Andersen AFB, Guam. From there they were rotated (one WC-130 was rotated about every 20 days) to, and operated from Udorn Air Base, Thailand. While at Udorn, the aircraft and crews were assigned temporarily and administratively to the 1st Weather Group's Operating Location 2, and came under the operational control of Seventh Air Force--actually, the 1st Weather Group commander, wearing his Seventh Air Force staff weather officer "hat." Evidently because ramp space, maintenance and living facilities were at a premium, no more than two WC-130s and 50 men were permitted at Udorn simultaneously. Carrying flare racks capable of dispensing 104 silver or lead iodide flares (a 40 millimeter aluminum photoflash-type cartridge case with primer and a candle assembly), the WC-130s were expected to generate at least one sortie per day, or approximately 220 hours per month. Cloud seeding sorties were flown at the freezing level, which was generally about 18,000 feet. Two RF-4Cs based at Udorn were also specially configured and used on the rainmaking project--they could carry 104 flares in their photo cartridge compartments--and were also expected to maintain a sortie rate of one per day.[58]

The first operational rainmaking missions were flown in March 1967 under a project labeled variously as Popeye, Intermediary, Compatriot, and, by AWS, Motorpool. Some 591 rainmaking sorties were flown by the unarmed and unescorted WC-130s and RF-4Cs in 1967, and 737 in 1968 (during which 6,570 flares were expended in 1967, and 7,420 in 1968) over Laos, North Vietnam and, specifically, the A Shau Valley. Particularly, during the Tet offensive, AWS WC-130s were flown on 47, 34, 31, 30, and 33 rainmaking sorties in the months of January through May 1968, respectively. During those missions the WC-130 crews also made occasional dropsonde releases and relayed both vertical and horizontal observation data in the clear to the 1st Weather Group's weather center at Tan Son Nhut, Detachment 14.[59]

General Westmoreland was one of only four general officers in Southeast Asia during the Tet offensive who were privy to the details of the tightly controlled rainmaking missions, and in memoirs he published in 1976 he asserted that the operation resulted in "no appreciable increase" in rain over the Ho Chi Minh Trail.[60] Indeed, one of the project's most difficult aspects was quantitatively determining how much, if any, additional rain fell over and above the climatological average to be expected. However, using empirical and theoretical techniques, it was estimated by experts that rainfall was increased in limited areas up to thirty percent and, subjectively, that it contributed to slowing the enemy's flow of supplies into South Vietnam along the trail. Not only that, but at a cost of $3.6 million annually, rainmaking was less costly than traditional air interdiction methods, and, more important, it was more humane because it saved lives.[61]

The very nature of the project led it to be cloaked with an armor of secrecy, and raised interesting possibilities. The few civilian officials in the State and Defense Departments with access to the project considered it extremely sensitive politically. The potential existed for disrupting the area's delicate ecological balance. Moreover, the international legal implications were staggering if Thailand, for instance, alleged that its rice paddies were unlawfully denied the water precipitated over Laos by the operation--a form of aerial riparian rights. Thus, the governments of Thailand, Laos, and South Vietnam were not informed about the operation, nor were the American ambassadors to those countries.[62] * General Westmoreland and his deputy at USMACV for Intelligence knew, as did the Seventh Air Force commander, General William W. Momyer, and his deputy for Intelligence. About half a dozen in the 1st Weather Group knew, in addition to the crews flying the

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*In March 1971, nationally-syndicated columnist Jack Anderson broke a story about Air Force rainmakers in Southeast Asia. It opened the floodgates. Three months later various versions of the so-called *Pentagon Papers* were published, portions of which confirmed Anderson's scoop. Following in relatively close order was an article on Air Force rainmaking in the magazine *U.S. News & World Report*, and one by Seymour Hersh, the reporter generally credited with first making public some of the details surrounding the Army's First Lieutenant William L. Calley and the infamous My Lai or "Pinkville" massacre in Vietnam.

With such publicity, congressional inquiries began, spearheaded by Senator Claiborne Pell. The Rhode Island Democrat had a resolution passed expressing the sense of the Senate that the United States seek a treaty banning environmental (weather and climate) modification as a weapon of war. Until 1974, when Pell finally consented to listening to a top secret Defense Department briefing on the Air Force's rainmaking in Southeast Asia (which the solon promptly placed in the public domain), State and Defense Department officials refused to comment publicly on the allegations by the press.

In July 1974, over Defense Department objections, and in connection with the strategic arms limitation talks (SALT), the United States and Russia issued a joint communique from Moscow announcing their intention to conduct talks on banning environmental warfare. In August 1975 the missions. No one else in theater knew, including the commander of the squadron at Udorn whose two RF-4Cs were being used.[63]** No one at the 5th Weather Squadron knew of the rainmaking mission--nor the fog clearing effort at Khe Sanh, for that matter. Nor did Major General Tolson.[64] And if the possibility existed of rain being denied the Thais, then it also existed for seeded clouds to drift over the A Shau Valley where rain caused havoc with Tolson's "reconnaissance in force" during the Tet offensive.

Forecasting, and Staff Weather Officers

All weather support to General Westmoreland and his USMACV staff was furnished by the 1st Weather Group staff and its weather center--Detachment 14--at Tan Son Nhut Air Base.[65] It perpetuated AWS' centralized forecasting doctrine in the combat area. Center weathermen gave daily briefings to the USMACV commander or his staff that varied in number (usually from two to six during the Tet offensive, spanning some seventeen hours) and content depending on the tactical situation and urgency. They included daily weather summaries and weather satellite photographs. In addition, the weather center issued a seven-day forecast each Saturday for the Republic of Vietnam to give Westmoreland and his field commanders a feel for the type of weather to expect during the upcoming week. Beginning 15 February 1968, it also began issuing a special five-day outlook for the northern provinces, and continued producing it until 6 June. AWS policy forewarned a lack of skill in forecasting beyond seventy-two hours, and weather group officials were therefore reluctant to issue five- and

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*(Cont) two countries submitted to the Geneva conference of the United Nations' Committee on Disarmament a joint draft treaty to that effect. It was approved by the United Nations General Assembly in December 1976, which adopted a resolution calling for the United Nations Security Council to open the treaty for ratification and signature by member nations. The United States, Russia, and 32 other nations signed the treaty in Geneva in May 1977, but by the close of 1978 it had not been submitted by the executive branch to the Senate for ratification. AWS was of the opinion that the treaty's language was so vague that it did not affect its capabilities in weather modification.

AWS WC-130s were flown on rainmaking missions in Southeast Asia continuously from 1967 to July 1972 when they were terminated. Through the close of 1978 the capability had not been exercised operationally again, although the Air Staff instructed MAC in September 1977 to retain the capability.

See: Vol I, "Narrative," pp. 495-507, of "History of Air Weather Service," 1Jul70-30Jun71 (S); Vol I, "Narrative," pp. 366-87, of "History of Air Weather Service," 1Jul71-30Jun72 (S); Vol I, *Narrative*, pp. 245-54, of *History of Air Weather Service*, 1Jul74-31Dec75 (S); and Vol I, *Narrative*, pp. 12-21, of *History of Air Weather Service*, 1976, (S).

**The 1st Weather Group commander, Col Edwin E. Carmell, said later that when he went to make the initial arrangements for the operation at Udorn, the RF-4C commander insisted he not be told what it entailed. He flew photo recce missions over North Vietnam and, should he be shot down and captured, he would be unable to reveal to enemy interrogators any of the operation's details.

seven-day forecasts; they did so primarily because Army and USMACV authorities insisted on them.[66] The long range forecasts were over and above routine severe weather warnings the center issued; 24-hour operational plain language forecasts to support naval operations along the Vietnamese coast; a bulletin containing a verbal description and interpretation of the latest weather satellite data; special climatological studies; a 24-hour operational area forecast for the Republic of Vietnam issued four times daily; and a plain language forecast discussion (popularly referred to as the "streamline analysis") issued twice daily to explain the synoptic situation and outlook for the following forty-eight hours.

Prognoses by the center's forecasters were predicated upon surface and upper air observations from a host of sites throughout Southeast Asia (excluding North Vietnam, of course) and from United States Navy vessels in the Gulf of Tonkin; climatological data; weather satellites; weather radars; weather reconnaissance; pilot reports; selected charts and bulletins transmitted via facsimile from AWS' Asian Weather Central in Japan; and data available from teletype circuits through weather relay centers at Kadena Air Base, Okinawa, and Clark Air Base in the Philippines. Forecasters at Detachment 14 in 1968 found the most successful prognostic technique to be continuity--i.e., forecasting yesterday's weather for today, and today's weather for tomorrow.[67]

Beginning 18 February 1968, to assure that only one forecast was used, the weather center assumed the responsibility for issuing 24-hour terminal forecasts twice daily for Khe Sanh, Hue, and Phu Bai.[68] Until late July, it was required to pass its Khe Sanh forecast to the senior weather officer with the Joint Chiefs of Staff.[69] Six days later, on 24 February, it began issuing terminal forecasts for the A Shau Valley. However, confusion resulted when Detachment 14 transmitted the forecasts under the operation's codename--Delaware--because weather personnel in the field did not know the codename, and therefore, knew not where the forecast was for. Eventually, the 1st Weather Group sent a classified message revealing the location. The center continued issuing the A Shau Valley forecasts until 17 May 1968.[70]

The center did not have a capability to transmit any of its products via facsimile, and there were no facsimile receivers at any weather units supporting Army tactical units; most of the sixty-word-per minute weather teletypes the Army furnished 5th Weather Squadron units had a receive only capability; and the teletype circuits to them were either out of commission or saturated, particularly during the Tet offensive.

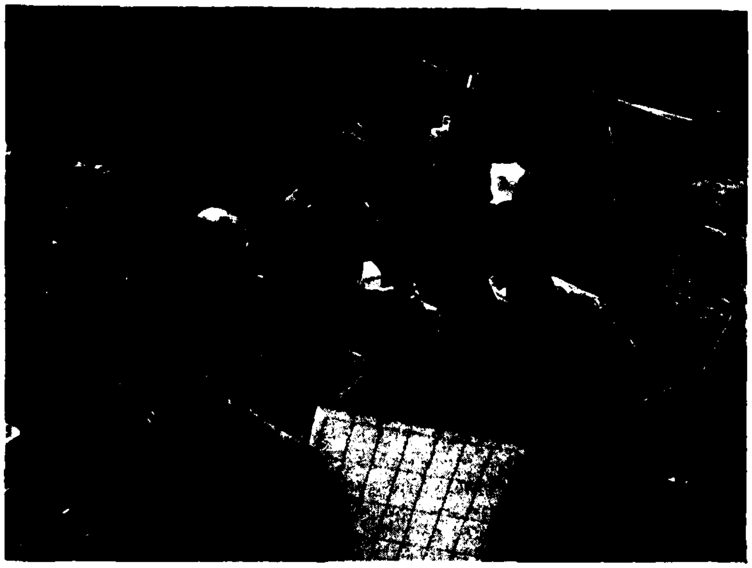
It made little difference. Few 5th Weather Squadron units in the field had any use for, or confidence in, the weather center's forecasts; and the forecasters at Detachment 14 reportedly cared less, by and large. A captain who manned the current operations officer position at the 1st Weather Group during the Tet offensive reported that Detachment 14's role and mission was never understood by field weather units; there was "extremely poor rapport" between the weather center and the field units; and that,[71]

> Det 14 operated under the concept that their mission was to make out-of-country target forecasts [forecasts for targets to be struck by air in North Vietnam, Laos, and Cambodia]; secondly, they expected field units to brief their products without question. Invariably almost all the field forecasters could recite cases of poor forecasting and poor attitude by Det 14 personnel. No one could pinpoint the reason for this, and it has been given command attention; however, it is still a problem.

His opinion was supported by the operations officer of the 30th Weather Squadron, the unit furnishing service to Seventh Air Force aircraft flying tactical missions during the Tet offensive. "Detachment forecasters had little or no faith in the center's product," he reported, because of a "credibility gap" caused by Detachment 14 forecasters seeing their primary mission as a briefing facility for USMACV and Seventh Air Force authorities rather than as an actual forecast center for the entire theater.[72] "There is no centralized product being produced in Vietnam strictly for Army dissemination," wrote Major Micale, the 5th Weather Squadron operations officer,[73]

Major Peter N. Micale

> and upon which all the division weather teams base their forecasts. The teams at the headquarters level of USARV and the . . . corps equivalent Field Forces are not manned and do not have the comm [-unications] to put out a centralized product. It must simply be stated as a fact of life that the SEA WECEN [Southeast Asia Joint Operations Weather Center--Detachment 14] is producing products for the AF out-of-country air war over North Vietnam.



Maj Gen Tolson (center) being briefed during Operation Pegasus. (U.S. Army Photo)

Until 18 February 1968, the responsibility for issuing terminal forecasts to Army division commanders and their staffs, and forecasts for operations such as Pegasus and Delaware, rested with the forecasters at the individual 5th Weather Squadron unit (operating location) supporting them. That was an extremely significant prerogative for the local forecaster because, as Captain Thomas E. Taylor reported, in his role as staff weather officer to the 1st Cavalry Division (Airmobile), Major General Tolson and his staff tended "to be doubtful of the weather forecaster until he had proven himself and his ability to forecast for his particular area of operations."[74]

Major General Tolson was highly thought of by both Captain Taylor and his boss, Lieutenant Colonel William H. Shivar, the 5th Weather Squadron commander. Shivar, who knew the general personally before Vietnam, said "he's the best war fighter I've run into," and that the success of his division in Vietnam was widely recognized.[75] A West Pointer (class of 1937) who logged numerous combat jumps (including the recapture of Corregidor in 1945) with a parachute infantry regiment in the southwest Pacific during World War II, Tolson had a background in Army aviation. He had a hand in the Army's development of the C-7, pulled two tours commanding the Army's aviation school or center at Fort Rucker, Alabama (one as assistant commandant, and the other as commandant), and was a qualified helicopter and fixed-wing pilot. As such he was "highly sensitive about weather support," Shivar opined; "he's probably one of the most weather conscious commanders I've ever known," and Tolson fully supported both Shivar and Taylor.[76]

"In my opinion, he was the epitome of what a general officer ought to be," Taylor said of Major General Tolson eleven years later; the 1st Cavalry Division (Airmobile) commander "was the closest thing I ever found to a god," he offered out of profound respect and admiration.[77] In Taylor's view, the 52-year old general was deeply concerned with the welfare of his troops--some 26,000 of them in the division, equipped with about 500 helicopters--especially the younger, lower-ranking enlisted men. The general was constantly touring the battle area, not to harrass or second-guess his company commanders, but to let his young fighting men see him and know he was aware of, and empathized with, their plight. With each day's casualty reports, the North Carolina native inquired of the artillery section responsible for fire support what more might have been done to keep the names of his young men off the death rolls.[78]

To find one of Major General Tolson's units that would feed and shelter his men, Captain Taylor--who was a slim and trim bachelor--was forced to locate his weather operations in a tent and bunker complex about a mile and a half from the division command post. On 19 May the entire weather complex was leveled by shock and blast waves from exploding ammunition in a huge dump hit by enemy mortar and rocket fire. Reconstruction by Taylor's men commenced immediately, and three days later they had their complex back in operation.

Captain Taylor and his two forecasters rarely briefed individual helicopter pilots, and gave scant attention to the division airfield because "choppers" were the division's means of maneuverability. They did, however, brief Major General Tolson twice daily with twelve-hour forecasts for the division's area of operations, and they briefed his staff on climatology each month--or more frequently if the tactical situation warranted it.

Captain Taylor dealt directly with Major General Tolson in such affairs, not through the division Intelligence officer, and the two shared excellent rapport. Major Micale, the 5th Weather Squadron operations officer, observed that of all the Army divisions the squadron supported during the Tet offensive, the rapport with the 1st Cavalry Division (Airmobile), through Taylor, was best.[79] In "all major operations such as . . .the relief of Khe Sanh and . . . the A Shau Valley the planned starting dates of both were based on forecast weather," Taylor wrote.[80]

Notwithstanding Major General Tolson's displeasure with Detachment 14's climatological forecast, which prompted General Westmoreland to sanction a drive into the A Shau Valley in mid-April instead of May, he was extremely weather conscious, and made extensive use of Captain Taylor, his forecasters, and his observers. On flights to the battle areas the general often found it to his pleasure to take Captain Taylor along for a form of "weather reconnaissance." When the 1st Weather Group found it out, Taylor was ordered to stop. Just prior to the A Shau Valley sweep, Taylor declined an invitation by Tolson to join him on flights into the area. In reply to the general's amazement, Taylor explained the group's edict, which was based on a fear of weathermen becoming casualties unnecessarily. Shortly thereafter, Taylor was telephoned by the group with instructions to resume his "weather reconnaissance" flights--Taylor later learning through the grapevine that Tolson personally called the group commander, Colonel Griffin H. Wood, explaining that he operated under the concept that Taylor and his weathermen were his to do with as he saw fit, operationally speaking; and, if that was not the case, then the 1st Weather Group could damn well recall Taylor and his men immediately because he had no use for them.[81*]

Tolson had made it quite lucid to Taylor that he would be fired if his forecasts were no good. Under such pressure, Taylor opted to send some of his observers into the A Shau Valley with Tolson's forces. The general concurred. H-hour for the A Shau Valley "reconnaissance in force" was delayed two days due to a 48-hour forecast Taylor briefed to Tolson. On the operation's eve, Taylor also personally briefed both Tolson and the commander whose brigade spearheaded the sweep. Once the operation was in progress, Taylor made frequent helicopter trips into the valley, and he briefed current and forecast weather to Tolson or his staff every four hours, 24 hours a day.[82]

Taylor stressed that he functioned primarily as a weather briefer, that the weather forecasts the 1st Cavalry Division (Airmobile) used were actually prepared by the two forecasters assigned him: First Lieutenant James P. Reilly and Chief Warrant Officer Wilbur Sunday, who had served as a gunner on B-17s in World War II. About midway through the Tet offensive Mr. Sunday rotated and his replacement was Staff Sergeant John R. Fix. "NCO forecasters in the field are the ones who carried Air Weather Service while we were there," Taylor asserted.[83] Fix and Reilly were responsible for the prognoses used during operations Pegasus and Delaware. During the former operation they passed the forecasts via FM radio to Taylor's weather observer team with one of the division's brigades at Quang Tri; in turn, the observers passed the forecasts to Taylor, who remained at Landing Zone Stud through the relief of Khe Sanh.

The prognoses prepared by Captain Taylor and his forecasters were written in longhand and called to the three-man teams of enlisted weather observers he had at the headquarters or command posts of each 1st Cavalry Division (Airmobile) brigade. Because there were no teletype or facsimile machines at the brigades, and because of AWS directives prohibiting enlisted observers from interpreting weather reports, the forecasts and forecast amendments were copied verbatim and passed

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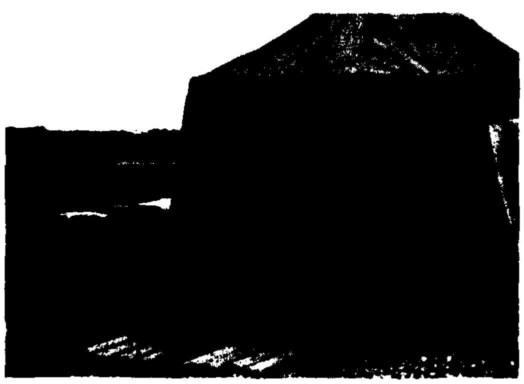
*Col Wood's prohibition against his people flying combat missions was discussed during a visit to Vietnam by the 1st Weather Wing commander in June 1968. Within a month of that visit, Wood rescinded his edict.

Maj Gen John J. Tolson, III (US Army Photo)

Captain Taylor, Vietnam, 1968. (USAF photos)

Above, Capt Taylor with weather map and briefing board used to brief Maj Gen Tolson.

Right, at Camp Evans in 1968, are Capt Taylor (right) and his chief observer, TSgt Robert L. Smith.



Capt Taylor's accommodations. (Photos by Capt Taylor)

Above left, at Camp Evans in 1968, are 1/Lt Reilly (left) and SSgt Fix. (Photo by Capt Taylor) Above right, front row, at Camp Evans in 1968, are CWO Sunday (left) and TSgt Smith. (Photo by Lt Col Shivar) Below, SSgt Fix prepares chart Capt Taylor used to brief Maj Gen Tolson. (USAF photo)

to the brigade Intelligence officer for briefing the brigade commander--a policy that irked Taylor no little bit.[84]

Actually the 5th Weather Squadron was aware of cases where, when the fighting was intense and communications back to forecasters with the division broke down, weather team observers were tendering on-the-spot forecasts to the brigades they supported, based on the latest half-dozen or so hourly observations they had taken. Under such circumstances the squadron was disinclined to make an issue of the practice, especially when no complaints were aired by the divisions or brigades.[85]

However, one serious drawback with such latitude in forecasting discipline during periods of intense and relatively prolonged fighting, when the weather was miserable and the attention of theater decision makers was more attuned to it, was that it quickly surfaced an age-old bugaboo of AWS--conflicting forecasts from different of its units supporting various tactical elements engaged in the same area of operations. Forecasts funneled General Westmoreland or his staff at USMACV by Detachment 14 might be at odds with forecasts the 5th Weather Squadron was filtering to USARV, or those its detachments were passing to I and II Field Forces; and forecasts promulgated by staff weather officers at one division might vary substantially from those being used at higher echelons, or from those distributed by a fellow forecaster with a sister division jointly engaged in the same operations. In Captain Taylor's case, during operations Pegasus and Delaware, he spoke frequently over the FM radio to his counterpart twenty miles south with the 101st Airborne Division at Camp Eagle, Captain Ronald W. Clarke, coordinating the forecasts they were passing to units of both divisions. But elsewhere the problem was of sufficient seriousness to prompt the 1st Weather Group to give its weather center the responsibility for issuing terminal forecasts for Khe Sanh, Hue, and the A Shau Valley.

Nevertheless, most 5th Weather Squadron forecasters at division headquarters and command posts continued to add personal "body English" to those Detachment 14 terminal forecasts that somehow filtered through despite the weather communications breakdown discussed below; and they all functioned under the premise that "official" terminal forecasts were often not necessarily the same as daily operational forecasts.

Actually, 5th Weather Squadron staff weather officers and forecasters supporting Army divisions during the Tet offensive operated pretty much in a vacuum, and had to get by with "seat-of-the-pants" or rule-of-thumb (single station) forecasting techniques because, not only were weather communications constantly disrupted between them and Detachment 14 or their parent detachments at I and II Field Forces, but communications were equally insufferable, by and large, between them and their weather observer teams deployed forward with various of the divisions' brigades or regiments engaging the enemy. Captain Taylor, for instance, who estimated that his teletype connection to Detachment 14 was out of commission sixty percent of the time during the Tet offensive, found the weather center's gridded streamline analysis to be his biggest help; the balance of the center's products, including the terminal forecasts, he and his forecasters used as guidelines only because they had little faith in them.[86] Often, therefore, short-period operational and terminal forecasts (3-to-24 hours) issued by forecasters at division level became a mere extension of the half-dozen most recent (when available) hourly observations taken by their observer teams with the brigades.

Even then, coming as it did toward the transition in monsoon seasons, the Tet offensive posed a difficult forecasting problem so that forecasting today's weather for tomorrow (persistence forecasting) which might be the only alternative, was not necessarily the safest thing to do. It was easier to forecast in the middle of a monsoon season when the weather was predominately good or bad (depending on the locale), and not in the gray areas of the fringes. Climatological tables were of less value at such times. It was why it was extremely difficult for Captain Taylor to assure Major General Tolson three continuous days of favorable operational weather before launching the A Shau Valley sweep.

In the northern provinces, where fighting was heaviest, the battle area to be forecast for was relatively small, but the valleys and surrounding mountains rising 3,000-to-4,000 feet added to the perplexity. The Khe Sanh-Quang Tri-Phu Bai-A Shau Valley area was roughly a rectangle, with sides 50 and 70 miles long. It was approximately 35 air miles from Major General Tolson's headquarters at Camp Evans to either Khe Sanh or the A Shau Valley, and 23 miles to Hue. From Camp Eagle, near Hue where the headquarters of the 101st Airborne Division was located, it was about 20 air miles to the A Shau Valley and 55 miles to Khe Sanh. So areas and distances to be forecast for were not excessive, but it was difficult to forecast when each day's ground-hugging fog and scud would burn off enough in the valleys to permit helicopter or tactical air support operations, and when it would settle back down to choke off air support.

The forecasting problems were further compounded by the fact that most forecasters were unproficient in tropical meteorology, and those with the 5th Weather Squadron directly supporting I and II Field Forces, the permanent airfields, and the divisions were inexperienced.[87]

AWS had taken steps by 1968 to run forecasters through either a two or a six week course in tropical meteorology on their way to assignments in Southeast Asia. But classes were small and, because of the one-year tour, the demand was large. Consequently, many arrived in theater without training or background in tropical meteorology. Many of those who received the training, or were experienced, were commandeered and pooled at the Detachment 14 weather center.

After he arrived at his duty station the forecaster's services were often of little use for another sixty to ninety days until he became adjusted to local weather regimes and the peculiarities associated with forecasting for units engaged in combat in the tropics. That process was further aggravated because, in many instances, there was no overlap in tours between the forecaster and the man he replaced. Thus, continuity broke down and experience had to be gained first hand. Then too, because of the one-year tour, forecasters never worked the same season twice.

The majority of those assigned to the 5th Weather Squadron's units had no prior experience in Army support. They had not studied Army doctrine at Fort Leavenworth or Carlisle Barracks, nor observed Army tactics and field operations at Fort Bragg or Fort Bliss; they learned about the Army in bunkers and sand-bagged, shrapnel-riddled tents, with flak vests and "tin pots" and steel-plated combat boots on, an M-16 rifle in one hand and an entrenchment tool in the other. When their initial one-year tour in Southeast Asia was over, extremely few AWS officers volunteered for consecutive or second tours in the theater.* So the experience level suffered further.

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*A person could, however, voluntarily extend his tour in Southeast Asia by six months, for which he received an additional seven-day

Of the fourteen 5th Weather Squadron detachments and operating locations in Vietnam during the Tet offensive, two were commanded by first lieutenants, twelve by captains.† Not that company grade officers could not do the job, but more experience would have afforded philosophical padding to the rigors, and field grade officers would have been accepted more readily by Army staff officers. Instead, AWS field grade officers experienced in both command and forecasting were siphoned off for duty with the 1st Weather Group's two other squadrons who supported Seventh Air Force elements in Thailand and the Republic of Vietnam.†† Most company grade forecasters had less than three years commissioned service in weather, including basic and advanced training. At division level AWS company grade officers served as staff weathermen to major generals commanding 16,000 or more men; at corps level (I and II Field Forces) they responded to questions from three-star Army generals about meteorological matters.**

When the communists opened their Tet offensive, the staff weather officer at I Field Force had been in Vietnam seven weeks, while his contemporary at II Field Force had been on duty three weeks; Captain Taylor, 28 years old at the time with three and one-half years of forecasting experience, but no command experience, had been in Vietnam as Major General Tolson's staff weather officer less than two

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*(Cont) R&R (Rest and Recouperation) out of theater and a free thirty day leave. Again, however, few AWS officers elected to do so. One who did was Captain Herbert Weigl, Jr, who served as staff weather officer (Operating Location 1, Detachment 32, 5th Weather Squadron) to the 1st Infantry Division from June 1967 to January 1969. (Telephone interview by author on 19Jun79 with Maj Weigl.)

†By comparison with the other two AWS squadrons supporting the Army exclusively at the time, of the twenty-five 16th Weather Squadron detachments and operating locations headed by officers, one was commanded by a lieutenant colonel, 6 by majors, 16 by captains, and 2 by first lieutenants; of the twelve 7th Weather Squadron detachments and operating locations headed by officers, 2 were commanded by lieutenant colonels, 4 by majors, and 6 by captains.

††The seven detachments of the 1st Weather Group's 10th Weather Squadron in Thailand were commanded by 2 lieutenant colonels, 4 majors, and a captain; the group's 30th Weather Squadron had ten detachments in the Republic of Vietnam, five commanded by majors and five by captains.

**The 5th Weather Squadron detachments at Headquarters I and II Field Forces were each commanded by captain forecasters who were responsible for large numbers of men--upwards of eighty or more, including subordinate operating locations. By comparison, the 16th Weather Squadron had lieutenant colonel staff weather officers with the XVIII Airborne Corps at Fort Bragg and III Corps at Fort Hood, neither of which had to contend with the command or administration of subordinate units. The same held true for the 7th Weather Squadron's staff weather officers with the V and VII Corps--a major and a lieutenant colonel, respectively.

The 7th and 16th Weather Squadrons were commanded by colonels, the 5th Weather Squadron by a lieutenant colonel.

months*--as had his counterpart to the 101st Airborne Division, Captain Clarke. Prior to Vietnam, Clarke pulled a tour supporting the Army aviation school at Fort Rucker, where Tolson was commandant. Although he reported directly from a one-year tour in Thailand, where he served as a forecaster supporting Seventh Air Force elements at Nakom Phanom, Taylor had not been involved in direct Army support beforehand.† His forecasters at Camp Evans had not either, nor had they experience or training in tropical meteorology. His enlisted forecaster, Staff Sergeant Fix, like most other AWS enlisted forecasters with the Army in Vietnam, was relegated to plying his trade behind the scenes because, as was the case with most other Army commanders, Major General Tolson preferred to receive his weather briefings from officers.[88]

Few forecasters, enlisted or officers, had been trained to survive in combat prior to being assigned in Vietnam. It was not surprising, therefore, that the 1st Weather Group, through its parent 1st Weather Wing, respectfully declined an AWS suggestion in 1968 to assign volunteer forecasters to Vietnam directly out of basic meteorology school, noting that the enthusiasm and zeal the eager young officers evidenced could not possibly offset the liability of inexperience during a one-year combat tour.

Under such handicaps, therefore, the paramount question was how good, how accurate, and how useful were the forecasts for ground and air support operations during the Tet offensive?

Speaking subjectively, because verification was difficult, and referring primarily to weather forecasts for targets in North Vietnam, Colonel Edwin E. Carmell, the 1st Weather Group commander until mid-January 1968, believed his forecasters did "darn well";[89] his successor, Colonel Griffin H. Wood, believed differently and, looking back over nearly thirty years' service, decried the lack of improvement in AWS' ability to accurately predict occurrences of both short and long range weather phenomena.[90]

Colonel Carmell served as the staff weather officer to both the USMACV commander, General Westmoreland, and the Seventh Air Force commander, General Momyer, but spent about seventy-five percent of his time in Air Force support and twenty-five percent in Army support. He had no experience in joint staff work prior to Southeast Asia, and he had "little or none" (in his words) previous experience in Army weather support--factors he saw as detriments in tackling his job in Vietnam, especially for such a short period.[91] Although he reported to, and responded through, Momyer's deputy for operations, he dealt with the Seventh Air Force commander daily, primarily through the rainmaking operation. He had infrequent contacts with Westmoreland--about once a month. Instead, for joint staff matters, he dealt with Westmoreland's deputy for Intelligence, whom he saw at least once a week.

Initially, due to his unfamiliarity, Colonel Carmell experienced difficulty gaining access to, and acceptance by, the USMACV staff. "Every now and again," the colonel said later,[92]

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*Tolson himself only commanded the 1st Cavalry Division (Airmobile) from April 1967 to July 1968, after which he took command of the XVIII Airborne Corps at Fort Bragg.

†Qualified as a parachutist, Taylor specifically asked for the staff weather officer job with the 1st Cavalry Division (Airmobile) so he could make parachute jumps and keep his rating current.

we would participate with regard to a particular [USMACV] decision. Toward the end of my tenure, when I began to realize how much more we could do, we were participating more in a planning factor where climatology entered into the play; where we could recommend to the commander, MACV, that perhaps he ought to start his sequence of battle action in the south rather than in the north as he had first started, just because prevailing weather was going to be to his advantage. And we participated in this regard much more fully toward the end of our first year [late 1967 and early 1968], and subsequent to that action, than we ever did in the first part of it.

And this was a situation where we really had to take the initiative because the [Army] commanders were just not aware that this information was available to them quite as readily as it was.

The USMACV staff was dominated by Army officers, and they did not appreciate the value of weather support, Colonel Carmell said, because weather's significance had not been stressed to them in peacetime. "I think the Army began there," Carmell opined, "to appreciate the worth of weather in its planning." "We got our foot in the door" in Vietnam, he continued; "the Army began to appreciate that using weather was beneficial and cost effective to their planning," but he confessed that it was a reincarnation, really, a realization among Army commanders reborn with each war but buried during peacetime.[93]

Col Edwin E. Carmell

Colonel Carmell emphasized that General Westmoreland insisted on being provided a seven-day forecast, and he said that, of necessity, such prognoses were hedged with extremely vague predictions.

The bread and butter for Colonel Carmell and his weather center at Tan Son Nhut were not the seven-day forecasts, nor forecasts for ground operations, but target forecasts for air strikes by Seventh Air Force aircraft--particularly for targets in North Vietnam. It was where Detachment 14's primary interests lay, and on them it kept tab.

During February, March, and April 1968, Detachment 14 issued 3,332 short-range forecasts for targets in North Vietnam, of which 88.6 percent verified.[94] More significant was the fact that, of the 9,242 sorties scheduled for Seventh Air Force aircraft against targets in North Vietnam during those three months, 609 (6.5%) were cancelled due to weather, and 3,906 (42.2%) were ineffective against their primary target due to weather; by contrast, of the 18,592 sorties scheduled for Seventh Air Force aircraft against targets in South Vietnam in the same period, only 259 (1.4%) were cancelled due to weather, and only 518 (2.8%) were ineffective against their primary target because of weather.[95]

The cardinal point to be understood was that Detachment 14's forecasts had very little impact on air strikes against targets in South Vietnam. Fighter and B-52 bombing missions in all kinds of weather were vectored over targets by ground control AN/MSQ-77 radars. All tactical air strikes in close support of ground forces were handled by airborne Air Force Forward Air Controllers (FAC). If the FAC could identify and mark the primary target it was struck; if it was obscured by weather he did not clear it to be attacked, but simply moved to secondary or tertiary targets free of weather, or passed the strike aircraft to other FACs who had workable, weather-free targets. And the potential value of recovery forecasts for fighter aircraft was negated by the fact that a bevy of tanker aircraft was normally available for mid-air refueling, and there were a score of accessible and suitable bases in South Vietnam and Thailand where they could recover if air controllers advised returning pilots that home base weather was prohibitive. Thus, when considering the close air support mission in South Vietnam, forecasters at Detachment 14 were more dependent on FACs and fighter pilots for weather information than vice versa.[96]

The same held true for tactical airlift missions in support of ground forces. Regardless of Detachment 14's terminal forecasts for places like Khe Sanh or the A Shau Valley, C-7 or C-123 or C-130 pilots launched--unless home base was nearly totally socked in by weather. And if the weather at Khe Sanh or the A Shau Valley precluded landings, techniques using vectors from ground-based radars had been developed whereby considerable accuracy was experienced by air dropping supplies. "Weather slowed down, but seldom stopped air deliveries" in South Vietnam, concluded one expert in tactical airlift operations.[97]

Even then, there was substantial customer dissatisfaction with Detachment 14's forecasts. In January 1968 the Seventh Air Force deputy for operations, Major General Gordon F. Blood, expressed misgivings to Colonel Carmell about the seven-day forecast weather center briefers were presenting Generals Westmoreland and Momyer. Blood said Carmell's forecasters were too vague and hedged too much. He wanted more statistics and detail. Another general officer on Momyer's staff personally kept statistics on the long-range forecasts, and could not understand why Detachment 14 did so poorly.[98] Because of the uncertainty of such long-range prognoses, Carmell and the weather center commander acknowledged that the forecasts were vague, and tended to be pessimistic in an effort to play it safe and avoid censure by busting one.[99] The forecasters were scientists, not clairvoyants.

Armor at long last came into acceptance during the Tet offensive,* and Army authorities were concerned about the effects of

*The generally unsuccessful experience of French armored forces in Vietnam through 1954 convinced the American military that armor rainfall on trafficability, as well as land-line communications. They were interested in forecasts--with as much lead time as possible--of two inches of rain or more in a twelve-hour period, but Detachment 14 forecasters did poorly predicting such phenomena.

Test of U.S. Army motorized vehicles in Thailand in the monsoon season, in 1962. (U.S. Army Photo)

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*(Cont) could not be employed there because of the monsoon climate, the jungle, and the rice paddies. Thus, for some time after 1965, Army planners saw little or no need for armor in the United States force structure in Vietnam.

In 1967, almost two years after the first Army ground combat units arrived in Vietnam, an Army study group investigated the use of armor there and concluded that tanks could move with organic support in 61 percent of the country during the dry season, and in 46 percent during the wet season. Armored personnel carriers could move in 65 percent of the country year-round. The Tet offensive ended the Army's long ambivalence toward armor in Vietnam, and convinced it that armored forces had utility in counterinsurgency and jungle warfare there.

In early 1969 the Army introduced a new tank to its armored forces in Vietnam, the M551 Sheridan. It was found that it had two disadvantages in combat: its combustible-case ammunition could be detonated by a mine blast or a rocket propelled grenade; and during the wet season its electrical fire-control system broke down repeatedly. See General Donn A. Starry, U.S. Army, *Mounted Combat in Vietnam*, from *Vietnam Studies* (Wash, DC: Dept of the Army, 1978), pp. v-vi, 9-13, 115-16, 136-37, and 145.

During the transition between monsoons in the spring of 1968, high-ranking USMACV and Seventh Air Force officers repeatedly asked the weather center briefers whether or not the southwest monsoon (generally unfavorable weather for ground operations in South Vietnam, but favorable weather for air strikes against North Vietnam) was upon them. "All decision makers from the Commander in Chief in the White House to the company commander in the field constantly need extensive information concerning the enemy, terrain, and weather," wrote General Westmoreland's deputy for Intelligence: "their desire for information is insatiable."[100] In the case of the monsoon determination they wanted a yes-or-no answer from the weathermen, not a technical discussion. Yet in the fringe area between monsoons, center forecasters found it impossible to say when the onset definitely arrived. The requirement to forecast such phenomenon four-to-six weeks in advance stimulated research activity in long-range forecasting techniques, but interim instructions from AWS and the parent 1st Weather Wing were that[101]

> care must be taken to insure that research results are not prematurely espoused to personnel in the operational environment and misinterpreted as an operational forecast.
>
> If used operationally, these untested techniques may have an unexpectedly high failure rate which lowers the prestige of AWS in the eyes of the customer. Of more importance, these inaccurate forecasts can impair the effectiveness of military operations. Therefore monsoon forecasting techniques will not be used as official AWS products until approved by Hq AWS, and monsoon forecasts referred to in official correspondence will be labeled as untested, experimental, or some other appropriate term.

Yet while Detachment 14 forecasters tended to be extremely cautious and pessimistic with their long-range prognoses, once the southwest monsoon set in, General Momyer's successor* in August 1968 told them that their forecasts of isolated-to-few thunderstorms for targets in North Vietnam were putting him out of business--implying that numerous thunderstorms were actually being encountered by his pilots and were hampering mission accomplishment.[102]

Once, when General Momyer vented similar frustrations to a Detachment 14 forecaster, Colonel Carmell went to see the Seventh Air Force commander the same day, saying he wished he could do something more by way of weather support to air operations. "Well, Ed," Momyer responded, according to Carmell, "it isn't the weather support that I'm frustrated about, it's the actual weather that's happening."[103] By way of summation, Carmell said that weather was not a primary consideration by Momyer in the target selection process; that the general sent his air armadas to North Vietnam twice a day, morning and afternoon, like clockwork, not because of a lack of confidence in Detachment 14's

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*General George S. Brown, who later caused the AWS leadership a lot of headaches with his subjective utterances before audiences of four-star Air Force generals to the effect that AWS weather support in Southeast Asia was conspicuous only by its inadequacy. Brown went on to become the Air Force chief of staff before being appointed by President Nixon in 1974 as chairman of the Joint Chiefs of Staff--where subsequently he twice embarrassed the administration of Gerald R. Ford with remarks about Jewish influence in America, followed two years later by comments about Israel being a military burden to the United States. See Vol I, "Narrative," pp. 230-36, 760-62, of "History of Air Weather Service," 1Jul70-30Jun71 (S);

forecasts,† but because the targeting process rarely left him the option of choosing tactics or timing based on forecast weather.

However, Seventh Air Force and Army decision makers in Vietnam urgently needed weather forecasts for very small areas and pinpoint targets, and Detachment 14 forecasters lacked the tools and skills in mesoscale forecasting to adequately meet those requirements. Weather center forecasters could predict gross changes in the weather, but not the specifics for a road, a ford, a hamlet, or a valley. Subjectively, therefore, since Detachment 14 did not verify them, the conclusion drawn was that the terminal forecasts issued by the center during the Tet offensive were not consistently accurate, nor was much faith placed in them, or use made of them, by either the 5th Weather Squadron forecasters and staff weather officers or the Army commanders and staffs they supported in the field.[104]

The support tendered Headquarters USARV at Long Binh by personnel assigned Headquarters 5th Weather Squadron consisted primarily of climatological inputs to staff studies, daily general weather forecasts for South Vietnam, and the weekly seven-day forecast given to the deputy commanding general and his staff. Such information was used as a long-range planning guide, and only rarely was it used in making go, no-go decisions.[105]

In early 1968 AWS was not uniformly or officially looking at forecasting accuracy from the standpoint of operational effectiveness--that was, ascertaining precisely what weather elements affected the operators weapons and tactics, and then keeping score on its ability to forecast those thresholds in a parlance operators understood. Such a program was what Major General Tolson obliquely referred to earlier, and would have negated his heartburn about the A Shau Valley forecast: it verified, but it sent the general's 1st Cavalry Division (Airmobile) in at the wrong time because it did not take into account the tactics and weapons used in airmobile operations.

The 1st Weather Group fostered a Product Evaluation Program (PEP), designed to measure the technical effectiveness of forecasts issued by its units--accuracy measured against standards for criteria AWS established.[106] It also attempted to monitor and

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*(Cont) and Vol I, "Narrative," pp. 5, 14, 80, 151-52, and 209 of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

†Some of Momyer's actions suggested otherwise, however. "As much as terrain or political restraints, weather was a key factor in planning and executing the air campaign," the general subsequently wrote. During the northeast monsoon in particular, it severely handicapped F-4 and F-105 success rates against targets in the Hanoi and Haiphong areas. Despite the weather center's forecasts, and despite the availability of timely, high-resolution pictures from weather satellites (which Momyer once described as "the greatest innovation of the war"), Momyer found it necessary to launch F-4 weather scouts two to three hours in advance of each strike to report prevailing weather conditions over targets in those areas. "The [air strike] force commander had a minimum of time to decide whether to abort the mission because of poor weather or to shift to the secondary target," Momyer wrote. "Many times during the northeast monsoon the weather would appear satisfactory when the force was less than 30 miles from the target, yet in the immediate vicinity of the target, a broken condition with 7/8 cloud cover was present. We had no way of predicting these rapid changes in conditions,

evaluate the technical effectiveness of its units' forecasts through staff assistance visits, and by periodically publishing technical notes. PEP gave each participating unit an opportunity to compare technical performances with the three-, six-, twelve-, and twenty-four hour forecasts.

But only half--seven--of the 5th Weather Squadron's units participated in PEP. Its detachments at I and II Field Force did not take part, nor did its operating locations with the divisions engaged in the fighting in the northern provinces during the Tet offensive. Its detachments at the Army's permanent airfields in Vietnam did, and their forecasting performance compared favorably with other participating 1st Weather Group units in the six categories evaluated. The problem was that their forecasts in 1968 had very little bearing on the go, no-go decisions affecting the Army aviation battalions and companies they supported at the airfields.[107]

The 5th Weather Squadron's detachment commanders at the Headquarters of the I and II Field Forces in 1968, who did not verify their forecasts, were at odds over the utility made of them. Weather service tendered II Field Force, which was responsible for Army operations in the southern portions of South Vietnam, was used primarily for long-range planning. The commanding general was interested in light data, especially moonlight, general trends, rainfall accumulation, tropical storms and typhoons, and, as a matter of curiosity, forecasts of tomorrow's weather. "At this level," the detachment commander reported, "weather support did not have much effect on specific combat operations."[108] Conversely, his contemporary at I Field Force, whose area of responsibility included the northern provinces where fighting was heaviest during the Tet offensive, noted that, as the helicopter increasingly became the lifeline to troops engaging the enemy, Army commanders became more concerned with the weather. "Go/no-go decisions based on the weather forecast occurred almost daily during periods of bad or marginal weather," he wrote, singling out specifically the 1st Cavalry Division (Airmobile) and the 4th Infantry Division as two who relied heavily on weather support.[109]

Differences in the Army's interest and use of weather forecasts could be explained to a great degree by the variance in the intensity and duration of fighting during the Tet offensive between the southern and northern provinces; by the fact that the northeast monsoon weather was generally less prohibitive to operations in the southern provinces; and by the fact that the Army's only airmobile division--and its life-sustaining helicopters--in the country was operating in the northern provinces.

At Lai Khe, for instance, fifty miles north of Saigon, where the 5th Weather Squadron's staff weather officer to the 1st Infantry Division

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†(Cont) so I counted on my strike force commanders to make the right decision when they saw the actual weather in the target area."

Also, weather would have been less a factor had it not been for restraints placed on Momyer's forces for positive visual identification of targets. The best weather for visual identification of targets in the Hanoi area during the northeast monsoon occurred between 1000 and 1500 hours, thus dictating strike times. Once Washington okayed a target, Momyer normally launched an air armada with all deliberate speed despite the weather forecast, because "pressures were strong at all command levels to hit a target once it was released for attack." See Momyer, *Air Power in Three Wars*, pp. 176-82, 219, 225, and 227-31.

At far left in top photo is Capt Herbet Weigl, Jr, staff weather officer to the 1st Infantry Division, together with three of his men in front of AN/MMQ-2 weather van at Lai Khe, 1968. Bottom photo is of the division's G-2 (Intelligence) office at Lai Khe. (Photos by Lt Col William Shivar, USAF) said his forecasts were fundamentally based on climatology and single station forecasting techniques, his prognoses were relatively accurate, he claimed, but the commanding general did whatever he wanted to anyway because the weather in his area of operations was stable.[110]

At Camp Evans, on the other hand, Captain Taylor said that his forecasts, which he believed were generally accurate, were used extensively and exclusively by Major General Tolson and the brigades of his 1st Cavalry Division (Airmobile) in successfully accomplishing established objectives at Khe Sanh and the A Shau Valley.[111] One of Taylor's forecasters, First Lieutenant Reilly, said later that their forecasts were not all that good, but that they were no worse than forecasts being passed by other 5th Weather Squadron forecasters to Army commanders and staffs elsewhere--and, of paramount importance, they were useful to division operations.[112] Tolson confirmed it. "I had A-Number-One support from Taylor and the Air Force all during that time," the general later recalled; "it was terrific," and "I would have been in one hell of a fix if I hadn't had it." The prognoses Taylor and his forecasters furnished were "a major consideration every time," Tolson offered, and they were "damn good forecasts."[113]

Both the 5th Weather Squadron commander and his operations officer were of the opinion that the prognoses issued by their forecasters at the divisions, based somewhat on persistence, were very good, under the circumstances, because they generally covered very short periods--one out to twelve hours.[114] And what their forecasters lacked in experience, they made up for in competency, aggressiveness, and innovativeness.

Communications and Logistics

Timely weather observations were the basic building blocks upon which forecasts in support of tactical operations were made; and adequate, two-way tactical weather communications were absolutely indispensable to both the forecasting and observing functions. Without communications both functions died on the vine. Without communications, observations were of little benefit to anyone, save maybe the climatologist. Without communications, forecasters had no raw material to work with, and no workable means of disseminating the fruits of their labor to those who could use them.

Since facsimile service was unavailable to 5th Weather Squadron units, the primary method of exchanging weather data was the sixty word-per-minute teletype system furnished and maintained by the Army. The minimum acceptable standard for teletype effectiveness (in commission rate for send or receive--or both--circuits and machines) established by the Air Force Communications Service for 1st Weather Group units was 95 percent. In January 1968, the overall teletype effectiveness rate at 5th Weather Squadron locations was 93 percent; it decreased to 85 percent in February, and there was little improvement in the poor rates in either April or May 1968.[115] During February 1968 seven out of twelve of the squadron's units had their teletype equipment and, or, circuits available less than 90 percent of the time in either the send or receive mode, or both.[116] "More than half of the teletype circuits to our units supporting and being supported by the Army do not meet the minimum standard monthly teletype efficiency," wrote the 1st Weather Group communications officer.[117] Squadron units with the worst rates were the operating locations with divisions--as the accompanying chart for five of them depicts.

5th Weather Squadron Teletype Effectiveness*

(Percent In Commission)

1968

Unit	February		March		April	
	Send	Receive	Send	Receive	Send	Receive
OL-1, Det 32 Lai Khe/Phu Loi (1st Infantry Div)	59.3	58.2	86.7	78.9	50.3	80.2
OL-2, Det 32 Cu Chi (25th Infantry Div)	99.0	89.0	93.0	86.0	82.0	73.0
OL-3, Det 32 Bearcat (9th Infantry Div)	N/A	91.0	N/A	68.2	N/A	81.0
OL-2, Det 31 Camp Evans (1st Cav Div, A)	N/A	92.0	(Unavailable)		N/A	42.0
OL-6, Det 31 Camp Enari (Americal Div)	N/A	92.0	N/A	92.3	N/A	91.0

Most menacing to the weather teletype effectiveness rates were circuit outages caused by breaks and damage from the heavy fighting and widespread mortar and rocket attacks. In addition, the sixty word-per-minute circuits, barely able to handle traffic in periods of good weather, were quickly overloaded and saturated during the bad weather in February and March 1968. Finally, formal Army programming procedures for equipment and circuit installation were too inflexible to be responsive to the moves the divisions and their brigades made.

Captain Taylor estimated later that the receive-only teletype system he had with the 1st Cavalry Division (Airmobile) at Camp Evans was out of commission sixty percent of the time during the Tet offensive--and, even then, he believed the Army did an outstanding job maintaining the antiquated machine and the vulnerable circuits.[118] Because of Major General Tolson's personal interest, within three days after his division moved to Camp Evans from An Khe in late January 1968 Army signalmen had a teletype installed and on line for Taylor. On 1 February, aware of the Army's unresponsiveness, the 1st Weather

*The figures presented represent the percent of time the teletype equipment and, or, circuits were in commission. Outages were attributable to malfunctioning circuits, machines, or power sources. An "N/A" on the chart indicates the unit's teletype had a receive-only capability. Chart sources: ltr Col Joseph M. Tyndall, ch, ops div, 1WG, to 1WW (OC), "Consolidated Weather Communications Report," 13Mar68; ltr Lt Col Shivar, comdr, 5WS, to HQ USARV (Signal Officer), "Weather Teletype Communications Effectiveness," 25Mar68; ltr Shivar to HQ USARV (ACofS, C-E), "Teletype Communications Effectiveness," 21May68; and ltr Maj Micale, ops officer, 5WS, to HQ USARV (ACofS, C-E), "Teletype Communications Effectiveness," 12Jun68.

Group petitioned the Seventh Air Force to immediately install a transmit capability on the teletype at Camp Evans to permit Taylor to forward forecasts, as well as surface and upper-air observations, via the weather communications net to the weather communications relay center at Tan Son Nhut.[119] It was June before a new, full-duplex, send and receive teletype circuit was installed between Camp Evans and the weather relay center;[120] but problems immediately cropped up with the send side of the circuit, and by the fall of 1968, when the division moved once again, Camp Evans still did not have a teletype send capability.[121] During the Tet offensive it meant that Taylor, as well as Captain Clarke with the 101st Airborne Division, and some other division staff weather officers, had to disseminate their hourly observations, and the twelve-hour terminal forecasts they made twice daily, by telephoning the most accessible 1st Weather Group unit that had a transmit capability for relay under the appropriate bulletin heading.[122]

Captain Clarke did not fare nearly as well with the 101st Airborne Division as Captain Taylor did with the 1st Cavalry Division (Airmobile). Unlike Taylor he did not enjoy the confidence and support of the division commander, Major General Olinto M. Barsanti. "He was a very difficult personality," reflected Clarke later, "a very difficult guy for everybody" on his division staff.[123] As a consequence, Clarke never interacted with Barsanti on a personal basis. He, therefore, had to go by the "book," and worked through the division Intelligence and Signal officers, and the headquarters and headquarters company personnel. His relationship with them was strained. Rapport was lacking.

Fourteen days after Captain Clarke's unit moved to Camp Eagle on 5 March, while he and his men were building a weather station bunker and "hootches" for quarters from material scavenged or bartered for, a receive-only teletype circuit and terminal was in operation. Teletype effectiveness ranged from fair to poor. The circuit or the equipment was out of commission about one-fifth of the time during the Tet offensive; in May 1968, the worst month, they were inoperative 47.5 percent of the time. He had one common-user telephone available, but his brigade weather observing teams had trouble contacting him because the telephone was frequently busy. It was a severe handicap because a request he made in early January 1968 to the division Intelligence officer for high-frequency, single sideband radios was denied on the grounds that none were available. The FM radio he had to talk to Taylor with was "borrowed." During the planning for operation Delaware into the A Shau Valley, it was determined that the brigade observer teams would need radios. A formal request was submitted, but once more denied on the grounds that the division had none, and because the Signal officer thought telephone communications would suffice. It was the same Signal officer who abruptly replied "tough shit" to a request by Clarke for a sole-user telephone in the interest of effective weather support to the 101st Airborne Division.[123] By the time Clarke rotated back stateside in late November 1968 his brigade weather observer teams still did not have radios.

Captain Clarke continually ran into a wall of indifference, unresponsiveness, and occasional outright hostility in attempting to obtain communications and logistical support from the 101st Airborne Division for his men and his mission. Support of his weather observer teams with the division's 1st and 3d Brigades was generally good. It was poor at the 2d Brigade where, on his first visit during the Tet offensive, he found his observers living and working in a hole in the ground with a shelter-half for a roof and no means of communications. When he asked the brigade Intelligence officer about the lack of support, he was told to look around and he would find a lot of other troops

Above, Capt Clarke's weather station bunker at Camp Eagle, 1968, supporting the 101st Airborne Division.

Right, Capt Taylor's weather station bunker at Camp Evans, supporting the 1st Cavalry Division (Airmobile). (USAF Photos) living no better than Clarke's observers. Clarke got them a tent and a telephone.[124]

The 1st Weather Group and 5th Weather Squadron interpreted the joint regulation to mean that the Air Force was responsible for weather communications support, long-line termination and equipment to the two squadron detachments directly supporting I and II Field Forces (the corps level--a concession, even then, in that the Army was to provide it at corps level and below); and that it was the Army's responsibility for communications support to the squadron's operating locations directly supporting divisions. Furthermore, in their interpretation of the directive, the Air Force would see to the weather equipment needed by squadron weathermen, while the Army was to furnish them logistical support. Army logistical support in Vietnam varied from division to division, and was dependent on a number of variables such as the Army unit commander's interest in weather support, priorities assigned weather team needs, and rapport between the weathermen and the Army unit they supported.* Supply and repair of the Army teletypes in the combat areas was poor. "Logistics support provided by the Army," reported the group to the parent 1st Weather Wing in 1968, "has proven inadequate to insure continuous operations at 5th Weather Squadron units."[125] Some supplies for the weathermen through Army channels were simply unavailable for requisition. They survived by requisitioning equipment and expendable supplies from the nearest Air Force unit.

Telephone and sole user or hot line voice circuits between operating locations at division level and their parent detachments and the weather relay center at Tan Son Nhut were normally available during the Tet offensive; but they were extremely scarce between the divisions and their brigades, particularly with rapid reaction forces such as the 1st Cavalry Division (Airmobile) and the 101st Airborne Division. Four additional sole user (radio microwave relay) hot lines were installed in early 1968 between the weather observer teams at brigades and their parent operating locations at division (two each with brigades of the 9th Infantry and Americal Divisions), but fourteen other weather teams had to rely on common user telephones.[126] The weather detachments at I and II Field Forces could reach the operating locations at divisions by telephone, but not the weather observing teams at brigades. In the case of the 101st Airborne Division, as the accompanying chart depicts, two-thirds of the 3,259 observations taken at Camp Eagle--which had a receive only weather teletype installed--from February through July 1968 were not transmitted to the outside world due to telephone outages.

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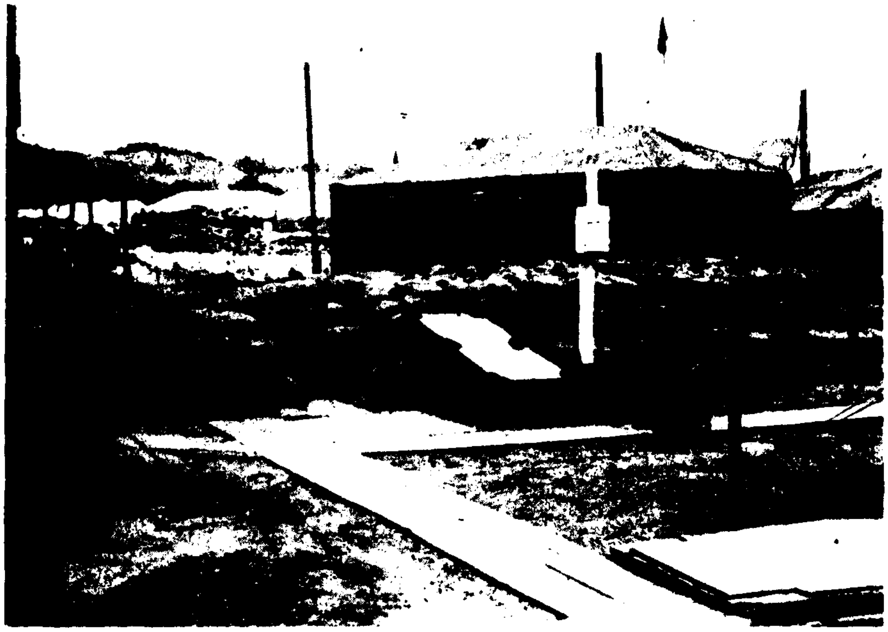
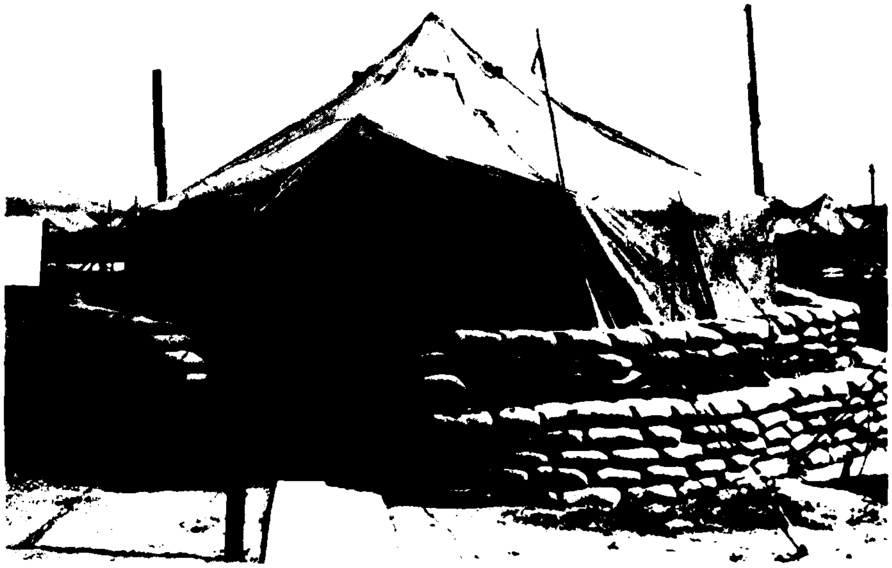
*In what was anything but a unique practice, Captain Taylor and his men bartered to obtain Army supplies--whiskey and rifles being the principal items of trade. Though rationed, beer was plentiful at Camp Evans; but Major General Tolson refused to allow any of his officers and men to have hard alcohol there. Taylor frequently rotated a portion of his men down to the beautiful beaches at Nha Trang (home of Headquarters I Field Force, and referred to popularly as the "Riviera of South Vietnam") for brief interludes of in-country "R&R" to relieve personal "pressures." Before returning, they purchased all of the cheapest whiskey they could, it being a legal commodity there. It was brought back to Camp Evans in laundry or B-4 bags or such. Taylor then sought out senior platoon sergeants, freshly returned from combat patrols, and bartered the booze for captured communist-made AK-47 rifles--which were in long supply. One bottle of Old Grandad, for example, might bring three or four AK-47s--depending on how long the sergeant and his men had been out in the





In photo at top is weather bunker at Dak To, in support of the 9th Infantry Division's 1st Brigade in 1968, while the bottom photo is of the weathermen's tent at Dak To. (Photos by Lt Col Shivar)

Captain Taylor was one of those who did not routinely have available telephones or hot lines to his weather observer teams at the brigades, so they relied heavily on jeep-mounted, FM radios for communications. The 1st Cavalry Division (Airmobile) staff weather officer estimated that eighty to eighty-five percent of the hourly observations taken by his observers at the brigades got back to him in a timely manner via the FM radios.[127] The FM radios worked extremely well so long as his brigade weather teams were within line-of-sight of him. However, during the relief of Khe Sanh and the "reconnaissance in force" into the A Shau Valley, the use of FM communications was impossible, and telephone or hot line communications were almost non existent.[128]

5th Weather Squadron Telephone Effectiveness†

February - July 1968

Unit	Total Obs Taken	Telephone Outage	Obs Not Transmitted	Remarks
OL-1, Det 32				1st Infantry Div
Lai Khe	3,087	1.8%	54	
Phu Loi	5,293	1.1%	58	
Quon Loi	3,210	2.0%	64	
OL-2, Det 32				25th Infantry Div
Cu Chi	5,065	6.1%	302	
Dau Tieng	2,609	5.0%	130	
Tay Ninh	2,514	4.2%	100	
OL-3, Det 32				9th Infantry Div
Bearcat	5,263	15.0%	786	
Dong Tam	1,633	40.0%	653	1Apr-31Jul68
Tan An	1,271	50.0%	636	1May-31Jul68
OL-2, Det 31				101st Airborne Div
Camp Eagle	3,259	66.6%	2,149	
Phouc Vinh	1,598	7.2%	114	1May-31Jul68

*(Cont) "boondocks" without a drink. In the same personal luggage, the AK-47s were taken to Cam Ranh Bay where the demand among Air Force personnel for the popular war souvenir was great--C-123 and C-130 crews paid $20 to $30 per rifle. Then, after a twenty-mile trip north, more cheap whiskey--about $3 a bottle--was purchased at Nha Trang with the profits. Booze was then bartered at Camp Evans for extra tents and plywood, boots and bullets, or survival essentials not authorized on weather unit TOEs such as machine guns and grenades. Thus, it was the fecund and surreptitious triangle trade in whiskey and enemy rifles that kept Taylor and his men afloat in Vietnam, not formal Army supply channels. (Telephone interview by author on 19Jan79 with Maj Taylor.)

†Unless otherwise specified, the data were compiled from 1 February through 31 July 1968. Telephone outages were attributable to either lack of ground power or telephone failures. Chart source: Capt Daniel R. Gornell, comdr, Det 32, 5WS, Long Binh AI, RVN, "Justification for Motor Generators and Single Side Band (SSB) Radios," n.d. (*circa* Aug68).

One of Capt Taylor's men, A1/C David B. Gittens, with his foot on the FM radio in the weather station bunker at Camp Evans in 1968. (Photo by Capt Taylor)

Observing

While communications were the life blood of effective weather support, enlisted weather observers were the backbone--particularly with the fluid division and brigade-level operations in Vietnam when it was often impractical or impossible to install much tactical meteorological observing gear.

As 1968 opened, the 5th Weather Squadron was undermanned, especially in the critical weather observer specialty. With 153 men assigned as of 31 January, the outfit was manned at 82 percent of its authorized strength. It was very low in observers--110 assigned versus 144 authorized. By comparison, its sister 10th and 30th Weather Squadrons were fully manned in observers, at or near 100 percent of their authorized levels. On top of that, with the stepped-up enemy activity, it was committed for up to six weather observer teams over and above the normal levy of troop commitments. Fortunately, both Captain Taylor with the 1st Cavalry Division (Airmobile), and Captain Clarke with the 101st Airborne Division, had enough observers throughout the Tet offensive. Most of the 20-to-22 men assigned Taylor's unit (operating location) were observers. Neither the squadron commander, Lieutenant Colonel Shivar, nor his operations officer, Major Micale, believed the observer shortage had any adverse effect on mission accomplishment.[129]*

*Shivar offered the view that overwork, rather than overmanning, was better for his troops from a morale standpoint. Morale suffered

The reason for the observer shortage was that increases in the 5th Weather Squadron's manpower authorizations had only recently been approved (in November 1967), and the personnel system was in the process of catching up with assignments as the Tet offensive kicked off. During February the squadron was brought up to authorized strength with the arrival in Vietnam of thirty-three additional men. Still, the manpower and equipment increases, coupled with the fluidness of Army units in combat from one end of South Vietnam to the other, resulted in a nearly impossible command and control problem for squadron authorities.[130]

When General Westmoreland moved most of the 1st Cavalry Division (Airmobile) and the 101st Airborne Division into the northern provinces in late January 1968, operating locations of the 5th Weather Squadron accompanied them to Camp Evans and Camp Eagle. In fact all division moves, and most of those by their brigades or regiments, were accompanied by squadron units and weather observer teams--a total of thirty-nine moves in all by the weathermen between January and June 1968.[131] In some instances, such as the siege at Khe Sanh, individual observers were deployed.

During the siege at Khe Sanh, qualified United States Marine Corps observers at the beleaguered outpost were taking hourly weather observations every day, except during periods of heavy fighting--a frequent occurrence. They were transmitted via AN/TRC-75 radio and then relayed by telephone to the 1st Weather Group's base weather station at Da Nang. There they were entered into the weather teletype circuits to the weather relay center at Tan Son Nhut for editing and further dissemination.

The problem with such circuitous routing was that the Marines were not meeting the 1st Weather Group's criteria for timeliness--surface observations were to be entered on the weather communications network not later than five minutes after time of observation. Additionally, Da Nang experienced trouble receiving the Khe Sanh observations, as well as those at other sites near the demilitarized zone the Marines were responsible for at the time, such as Dong Ha, Hue, Phu Bai, and Chu Lai. From December 1967 through 15 January 1968, an average of only ten observations per day were received at Da Nang from Khe Sanh;[132] during the first thirteen days in February 1968, an average of fifteen observations per day were received from Khe Sanh.

Teletype circuits linked Khe Sanh and the weather relay center at Tan Son Nhut, but there was no terminal equipment at Khe Sanh. In early January 1968 the 1st Weather Group formally expressed a need for a full-duplex, send and receive teletype capability between the two points, which was responded to in the form of an Air Force Communications Service mobile teletype van and team that arrived at Khe Sanh about a week after the North Vietnamese attacked there. On 8 February, the team was ordered out of Khe Sanh because it was not supporting an Air Force operation. Referred to Lieutenant General Cushman's III Marine Amphibious Force by USMACV, the group was advised in mid-March by the Marines that it would investigate the idea of installing terminal teletype equipment at Khe Sanh. However, higher priority operations preempted the project until well after Major General Tolson's 1st Cavalry Division (Airmobile) had cleared Highway 9 and lifted the siege in mid-April.[133]

During the interlude, on 26 February, the 1st Weather Group dispatched Sergeant Celestino G. Martinez, an observer from the Da Nang

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*(Cont) when men had too much spare time on their hands.

base weather station, into Khe Sanh to see about getting the Khe Sanh observations passed to the Tan Son Nhut weather relay center via a tactical command teletype circuit from Khe Sanh to Nakhon Phanom, Thailand.[134] But few observations found their way to Tan Son Nhut that way either. And 1st Weather Group authorities were of the opinion that, not only were the Marines misfiling the observations at Khe Sanh, their observations were inaccurate.[135]

Seventh Air Force's 834th Air Division at Tan Son Nhut also brought to the attention of the 30th Weather Squadron (whose mission included support to the tactical airlifters) that Marine observers at Khe Sanh were supplying erroneous altimeter settings (through the Marine air traffic controllers controlling all missions into and out of the garrison) to its C-7, C-123, and C-130 crews. It caused errors in altitudes while flying approaches there. When the Khe Sanh runway was closed by enemy action or weather (fog kept it closed forty percent of the time during the siege), low-altitude cargo extraction methods were used, and precise altitudes were an absolute must if the supplies were to fall into friendly hands instead of the enemy.*

The 30th Weather Squadron arranged through the 1st Weather Group to send a 5th Weather Squadron observer into Khe Sanh.[136] A call for volunteers was issued. One immediately stepped forward, who was within three days of completing a six-month extension to his one-year tour. Taking only a barometer and an AN/PMQ-7 with him by way of weather equipment, together with his side arm and an M-16 rifle, he was flown into Khe Sanh about the time Major General Tolson began his drive to relieve the outpost. He worked for days, with a minimum of sleep, to keep a steady stream of altimeter settings and observations coming out of Khe Sanh.**

On 1 April 1968, Captain Taylor took a three-man weather observer team with him to Landing Zone Stud where he briefed Major General Tolson on the forecast weather for operation Pegasus--the relief of Khe Sanh, which kicked off the same day. Taylor remained at Stud throughout the operation, trying to answer questions from the 1st Cavalry Division (Airmobile) commander and his staff about when the fog and scud would burn off each day enough to permit helicopter assault and support operations. Taylor alternated four observers to crew the three-man team: Sergeants Victor Bertoni, Kenneth G. Flett, Alton J. Keel, Jr, and Donald R. Toay. As the Marines and various elements of the division moved along Highway 9 to Khe Sanh the observers moved with them. Most of their time the first week or so was occupied by soldiering and surviving. Few observations were taken. They returned to Camp Evans the day Pegasus rolled up, 15 April.[137]

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*The low altitude parachute extraction system used to deliver construction material to Khe Sanh called for the pilot to fly his C-130 at 130 knots down the runway centerline at an altitude of just five feet! The modified container delivery system used to parachute supplies required a C-123 or C-130 pilot to traverse the Khe Sanh runway centerline at 130-to-135 knots at a specific altitude--typically, 400 feet. For an excellent discussion of those delivery systems see Nalty, *Air Power and the Fight for Khe Sanh*, pp. 42-59.

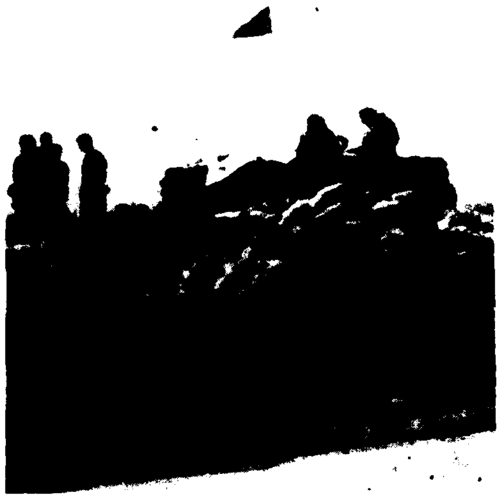
**Sources available to the author in 1979 revealed conflicting information regarding the implant of weather observers at Khe Sanh during the siege of 1968. During a 25Jun79 telephone interview, Maj Taylor said there were 5th Weather Squadron observers at Khe Sanh during the siege, but they were not his. However, the following day, while going over with the author, some photographs he took in Vietnam, he

Four days later, when the 1st Cavalry Division (Airmobile) launched its "reconnaissance in force" into the A Shau Valley, Captain Taylor and two of his observers went into the valley's northernmost extremities with the 3d Brigade's initial air assault and deployment. Taylor gave the final, jumping-off weather briefing to Major General Tolson and his 3d Brigade commander, Colonel Hubert S. Campbell. On 22 April, Captain Clarke put a weather observer team at fire support base Bastogne, some seventeen air miles east of the valley on Route 547, to support the 101st Airborne Division's 1st Brigade, whose job it was to seal off enemy routes of withdrawal and reinforcement into the area. Taylor stayed in the valley only until a 3d Brigade forward headquarters was secured--although he subsequently made trips in and out by helicopter with Tolson. His two observers there were David B. Gittens and David B. Miller, both with the rank of airman first class. They were armed with 38-caliber pistols, M-16 rifles, and grenades, and equipped with sling psychrometers, an AN/PMQ-4 manual meteorological station, and an FM radio.[138]

However, contact with the two airmen could not be maintained by FM radio so, beginning on 23 April, Captain Taylor kept another pair of similarly equipped observers in the A Shau Valley. Although three sergeants were used (Bertoni, Stanley Dzula, and Robert F. Cunningham), they spelled each other off so that only two were working in the valley at a time. They situated themselves with an artillery battery on the side of a hill overlooking the valley and remained there until 16 May, the day before operation Delaware was officially terminated. Gittens and Miller relayed their hourly observations with the FM radio to the sergeants on what became referred to as Signal Hill. The sergeants then passed those observations, and their own hourly observations (most taken in daylight hours only), to Camp Evans. From Camp Evans the A Shau Valley observations were then telephoned to Da Nang for entry onto the teletype circuits down to the Tan Son Nhut weather relay center. Such a cumbersome process meant that it was often an hour or more after the official time of the observation before the data was on the teletype lines.[139]

"It was muddy and wet up at the top of the barren mountain," Sergeant Cunningham was quoted later in describing his experience in the A Shau Valley.[140] Their position was near a pass leading into the valley, used by the helicopters. They provided information on visibility, wind speed and direction used by the pilots to help determine the safest flight path through the mountains to the valley.

**(Cont) remembered that Sgt Robert A. Ballard went into Khe Sanh--on a Marine CH-46 helicopter. Lt Col Shivar, in a telephone interview on 22Jun79, did not recall any observers from his squadron being at Khe Sanh during the siege. In a telephone interview with Col Micale three days later, the former 5th Weather Squadron operations officer related the story about the volunteer who had only three days more to complete eighteen months in theater. He remembered two observers going into Khe Sanh during the siege in a C-7. Yet in his end of tour report filed ten years earlier (included as Tab 33 of Fuller, ed, "End of Tour Reports," 15Apr70), Micale referred to just a single observer going into Khe Sanh during operation Pegasus--aboard a C-123! Col Tommy D. Guest (vice commander of the 3d Weather Wing), operations officer at the 30th Weather Squadron during the Tet offensive, during a telephone interview with the author on 28Jun79, recalled that a single 5th Weather Squadron observer was flown into Khe Sanh during the siege. The official 1st Weather Group, 5th and 30th Weather Squadron histories for the period make no mention of the subject.



Above, left, weather station at LZ Stud, with banner atop whip antenna for FM radio.

Above, right, Sgts Toay (left) and Bertoni at LZ Stud weather station. The weathermen slept under dirt and sand bags at picture's lower left. (Photos by Capt Taylor)

Left, at LZ Baldy in 1968, left to right: Sgts Keel and Gary R. Nunn, and Lt Col Shivar. (USAF Photo)

Above left, Sgt Cunningham (right) and unidentified observer with him supported 1st Brigade, 1st Cavalry Division (Airmobile) in 1968.

Above right, Sgt Flett at Camp Evans, 1968.

Right, A1C Gittens at Camp Evans, 1968. (Photos by Capt Taylor)

Army intelligence estimated that a full enemy battalion surrounded the weathermen, and contact was made several times. The observers arose each morning an hour before first-light to take weather readings and relay them to division headquarters. It continued until dark when they took turns with other men, sleeping and standing guard. When movement was spotted they threw grenades. Mortar crews then peppered the area. "One time, I saw movement only about 25 feet or so from my foxhole," Cunningham recounted,*

> I heaved a couple of "frags" [fragmentation hand grenades] and the mortars chopped up the immediate area. We made no attempt, however, to check the area afterwards. We were under orders not to fire our rifles as the flash would give our exact position away. It was, all in all, quite an experience--one that I'll never forget.

There was another way weather observations from the A Shau Valley were relayed. A combat control team from the 834th Air Division moved into the valley with the 3d Brigade's initial elements. It directed C-7, C-123, and C-130 airlift support. In early May, after the A Luoi airfield was secured, the team operated from there. It was equipped with high-frequency, single sideband radios, with which it could not only direct incoming airlift traffic, but could reach the air division's command center at Tan Son Nhut. Because operation Delaware developed so rapidly, and due to a dearth of intelligence, the 30th Weather Squadron had insufficient time to respond, so the team was relied upon for limited weather observations. It was not unusual. Most combat control teams had received training in observing wind speeds and direction, visibility, basic cloud data, temperature, and of course absolute pressure for altimeter settings. The team began taking observations the first day of the operation. They were transmitted by radio to the command center at Tan Son Nhut, telephoned from there to the squadron's base weather station, and then entered onto the weather teletype circuit. The air division's minimum needs were fulfilled by the limited observations taken by the combat control team, which had no contact with either of Captain Taylor's weather observer teams in the A Shau Valley.[141]

It was such occurrences that helped prompt Major Micale, the 5th Weather Squadron operations officer, to recommend scrapping the concept of furnishing weather observer teams to brigades. First of all, he mistakenly concluded that the concept had no legal footing in the joint regulation. Secondly, he highlighted the problems of communicating with the brigade observer, correctly pointing out that most of the problems could be laid at AWS' doorstep, and that they lingered despite mistakes that had been made, and acknowledged, in hundreds of exercises and maneuvers in the past, or in shooting scrapes like Korea or the Dominican Republic crisis. The brigade commander and his Intelligence officer could get their forecasts via radio from the staff weather officer at division--where the observers should be, maintaining a weather watch at the division airstrip, instead of being middlemen or second guessers for questions from the brigade staff. In the A Shau Valley the combat control team filled the bill,

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**Ibid.*

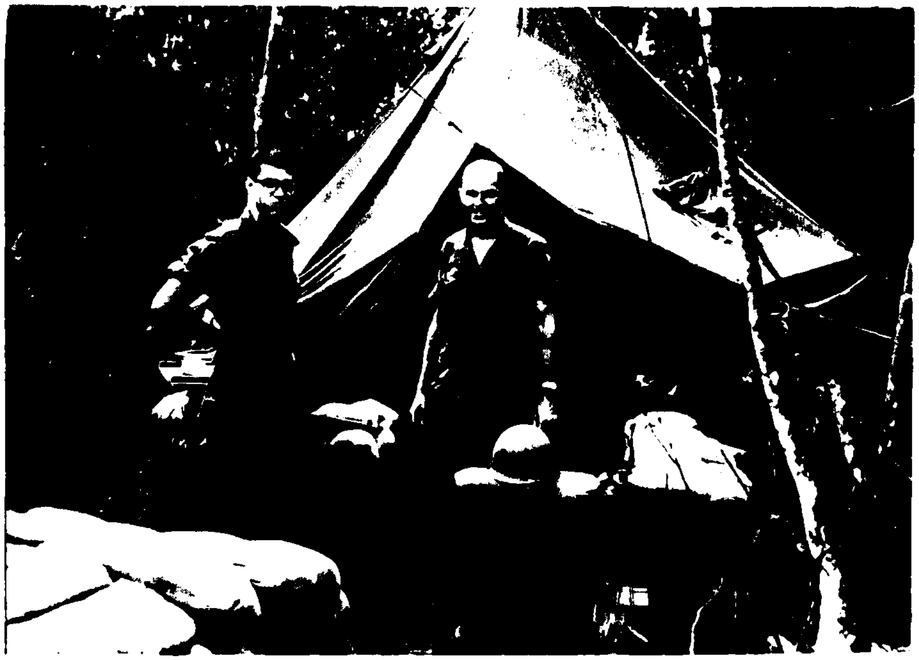
Micale offered, and during the relief of Khe Sanh the observers were too busy surviving to take observations. "About half of the observers of the squadron were not working as observers," Micale continued,[142]

> but yet, almost to a man, this was the best gathering of young, ingenious American men. They could beg, borrow, scrounge and "requisition" better than any Army trooper; they could dig, scrape, build and sandbag bunkers and tents better than any Marines; and they could build hot water showers, three holers, and NCO clubs--run at a profit--equal to any Seabee. There were no harder working or longer working men in all of SEA [Southeast Asia]. Their exploits will be legend in AWS for years to come, perhaps not as observers, but as redblooded American males who were experts at the art of survival.

But that was the point, the major concluded: though technically qualified, observers with brigades were mis-employed. Micale echoed the views of others before him in Vietnam; others afterward echoed Micale.[143] Captain Clarke did, but Captain Taylor did not. For one thing, Taylor said that a lot of times the observations taken by his men at the brigades were the only data his forecasters had to go on for their prognoses, teletype communications being in the sad state of repair they were during the Tet offensive.[144] Micale's recommendation was considered by AWS, but scuttled, primarily because the Army liked the idea of weather observers being with its brigades.

Another reason Major Micale opposed the concept was that, being mis-employed as he believed they were, weather observers at brigade level were being unnecessarily exposed to the perils of combat. Life with the Army in combat was hazardous, more so at the brigade level than back at corps headquarters (I and II Field Forces) --although, given the nature of the war in Vietnam, no level or locale was really ever immune. Captain Taylor could attest to that, because in September 1968 he and Sergeant Dzula were wounded by shrapnel during a rocket

Sgt Dzula tightening guide wires atop an AN/MMQ-2 mobile meteorological van in Vietnam in 1968. (USAF photo)



Above, Sgts Paul J. Dvorak (left) and Leroy P. Jordan, of OL-4 Det 32, in front of their quarters and weather station at Song Be in support of 1st Brigade, 101st Airborne Division, 1968. Below, Sgt Dvorak uses their representative observation site--chosen to observe three helipads and a fixed airstrip. (Photos by Lt Col Shivar)

attack on Camp Evans.[*] And the weather center itself, Detachment 14, withstood a Viet Cong rocket and mortar attack on Tan Son Nhut as the Tet offensive opened.[145] In the confused fighting that morning, rounds of countering fire from United States troops whistled by Colonel Carmell's head right in front of the Tan Son Nhut officers club.[146]

During January 1968 alone, there were forty-seven attacks (rocket, mortar, or assaults) by inimical forces on twenty-one Army installations supported by men of the 5th Weather Squadron.[147] In the early morning hours of 4 January, for instance, Sergeant Ballard incurred a flesh wound during a mortar attack that left over 100 shrapnel holes in Captain Taylor's weather station bunker at An Khe; and on 20 January a weather observer team supporting elements of the 101st Airborne Division at Song Be was fired on by snipers while detailed to get drinking water inside the base camp.

Bronze Star Medals were earned in the Tet offensive by two observers assigned the 5th Weather Squadron's Detachment 11 at Vinh Long--one of the Army's permanent airfields in Vietnam--for their efforts during a five-day siege by Viet Cong. A mortar barrage and infantry assault opened the attack, and Viet Cong mortar, recoilless rifle and machine gun fire continued five days. The weathermen helped defend the installation by arming rockets, resupplying helicopter gunships, and caring for casualties--nine Americans were killed, including the airfield commander. Staff Sergeant Larry D. Scoggins, the detachment chief observer, and Sergeant Ronald Maxemchuk proceeded under fire at one point to rescue a wounded soldier. Sergeant Barton J. Whalen remained at his post taking observations and assisting control tower personnel under flying shrapnel and heavy small arms fire in the opening stages of the attack. Not an observation or forecast was missed during the siege. Sergeants Maxemchuk and Scoggins were awarded Bronze Star Medals with V (Valor) Device by the Air Force; due to a mixup within Army channels, Whalen never received the Bronze Star for which he was nominated.[148]

Between January and June 1968 the 1st Weather Group had ten men wounded in action--all of them enlisted, most were observers, and all from the 5th Weather Squadron, including Airman First Class (promoted to Sergeant during the interval) Miller, who absorbed a minor shrapnel wound during a mortar attack on Camp Evans on 7 February.[149] The group also had four men killed in action during that period--the only combat fatalities AWS suffered in that war from 1961 through 1976. All four were weather observers, three of them from the 5th Weather Squadron.[†]

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[*] For which Taylor was awarded the Purple Heart, to go with the Bronze Star Medal the Army awarded him for his role in the A Shau Valley campaign, and an Air Medal the Army bestowed on him for his tour as Tolson's staff weather officer. He also earned a Bronze Star Medal from the Air Force for his tour in Southeast Asia.

[†] The fourth was Airman First Class Kenneth E. Baker, Jr, of the 30th Weather Squadron's Detachment 13 at Binh Thuy Air Base. He had been in Vietnam a little over a year when, on 22 March 1968, during the early morning hours, the base came under hostile artillery fire. Baker had been working in the weather observing station about an hour when it took a direct hit from a 75-millimeter recoilless rifle. He was killed instantaneously. Msg 632 CSG (BDP) to CSAF, *et al.*, info CINCPACAF (DPSP), *et al.*, "Casualty Report, Complete Death Report, Battle," 260520ZMar68.

Gen Westmoreland with military personnel at American embassy in Saigon on 31Jan68 following abortive siege by Viet Cong. (Army photo by SP5 Edgar Price)

Below left in 1968 is weather bunker at Landing Zone Baldy. Individual tent used by weatherman at Landing Zone El Paso is shown at right. (Photos by Lt Col Shivar)

On 4 March 1968, at about 0300 hours, the Army's permanent airfield at Ban Me Thout came under enemy 82-millimeter mortar attack. Assigned to the 5th Weather Squadron's Detachment 10, most of the weathermen there were asleep in their hootch when the second mortar round penetrated the roof and detonated before they could take cover. Staff Sergeant Reese J. Wardell, a forecaster, was seriously wounded, and was later evacuated stateside. Staff Sergeant Thomas L. Banes was also wounded. Staff Sergeant James C. Swann and Sergeant Edward W. Milan both suffered multiple, penetrating, shrapnel wounds. Swann died instantly. Milan was taken by helicopter to a field evacuation hospital at Tuy Hoa Air Base. He died enroute, having never regained consciousness. Swann and Milan were both married. Milan had been in theater a little over seven weeks.[150]

Exactly two weeks later, on 18 March, Staff Sergeant Eduardo Garcia, Jr, was a passenger in a jeep heading north, approximately five miles north of Landing Zone Baldy on Highway 1 in Vietnam. Married and the father of two sons, Garcia was assigned to Operating Location 6 of the 5th Weather Squadron's Detachment 31 at Chu Lai in support of Americal Division elements. The jeep party Garcia was with passed a burning village. They turned around and were ambushed. Garcia received mortal wounds from an AK-47 assault rifle while exchanging gunfire with inimical forces. Last rites were administered by an Army chaplain. Garcia's tour of duty in Vietnam had [illegible] on 19 February 1968.[151]

It was in March 1968, amidst the Tet offensive, that a shadow of shame was cast across America's conscience when an element of the Americal Division's 11th Infantry Brigade, under command of First Lieutenant William L. Calley, Jr, murdered a number of unarmed South Vietnamese civilians at the hamlet of My Lai. What became commonly referred to as the "Pinkville Massacre" pointed out, among other things, one of the basic frustrations faced by United States troops in what had been essentially a guerrilla war: clad in native attire as they blended with the local populace, how to distinguish the Viet Cong from friendly South Vietnamese.

An incident in early January 1968 at a 5th Weather Squadron unit illustrated that frustration. As in wars past, the G.I.s in Vietnam had soft spots in their hearts for children--particularly the orphans--caught up in the war's whiplash. A remote weather station of the squadron near An Khe was visited daily by children who sold fruit and Vietnamese souvenirs. The weathermen enjoyed the visits from the always smiling children--until one day when a seven-year old boy whipped a grenade out of his pocket and tossed it at them. Fortunately, the child was a novice at terrorism. He forgot to pull the arming pin. He acted as he did, he said, because he feared for the life of his family who were being threatened by the Viet Cong.[152]

The Problems

The problems encountered from the start in providing weather support to the 1st Cavalry Division (Airmobile) were typical of those faced by AWS personnel until the last Army soldier left the Republic of Vietnam some eight years later. The surge of Army units into Vietnam in 1965 and 1966 was so rapid and of such proportions that peacetime procedures requiring formal statements of requirements for weather support could not keep pace. Officials at Headquarters AWS insisted on following formal time-consuming procedures, while senior AWS officials in theater needed more people "right now," as one squadron commander emphatically phrased it. "Perhaps the single greatest deterrent to mission accomplishment for the weathermen in Southeast Asia" during 1965, read the official AWS account, "were the peace-time programming procedures adhered to at higher echelons of command for men and materiel needed . . . 'right now' in the war zone."[153]

A fundamental problem faced by AWS weathermen in Vietnam was that Army commanders in general were unaware of the service available to them through AWS, or did not know how to utilize it to benefit their operations, and, once advised of its nature by an aggressive staff weather officer or enlisted man, were happy with whatever they got. During one of the weekly weather briefings given him by an AWS briefing officer in early 1967, General Westmoreland remarked that "no other U.S. military commander ever had the advantage of the outstanding weather support that I have had at my disposal."[154] A year later, Westmoreland's successor as USMACV commander, General Abrams, signed a letter of commendation to the 1st Weather Group in which he wrote that "never in the history of warfare have weather decisions played such an important role in operational planning as they have here in Southeast Asia," specifically pointing out the battles at Khe Sanh and the A Shau Valley as examples.[155] Such glowing statements were a tribute to senior AWS officers who persisted in "selling" themselves and their services to USMACV, because in the beginning, USMACV officials, just as at I Field Force and elsewhere, were not interested in the weather and were generally unaware that it was AWS' mission to support them.[156] *

Some of the AWS officers and senior enlisted men supporting Army units in Vietnam reported that the Army was aware of, and used, their services; but twice as many indicated the Army was unaware, and, or had little use for them.[157] "It has been my experience," wrote the 5th Weather Squadron commander in 1970, "that the Army is happy with any support you give them."[158] "Adequate weather support to the Army," reported the 1st Weather Group commander in 1970, in summarizing the question,[159]

> is still a problem. The Army personnel are not trained or experienced in use of weather in their operations. Our people coming over are not, in most cases, familiar with Army operations. So it is sometimes difficult to get the two together. Once Army personnel get a sample of the support available they are most eager to continue getting the support. They are the easiest customers to please because, not knowing what is available, they are happy to get practically anything.

Notwithstanding their gratitude for what they received, the Army believed that "weather support . . . provided by the Air Force was inadequate" in Southeast Asia, according to the officer who commanded the 1st Weather Group in 1971, because AWS could not, or would not, give it what it wanted.[160] The long range, seven-day forecast was a case in point.

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*"Most Army operations personnel said glowing words about AF weather support," reported the captain who served as the 1st Weather Group's current operations officer during the 1968 Tet offensive; but they "seldom knew the locations of weather units serving their commands nor anything about how they supported it." (Captain Hilton, current ops officer, 1WG, 4Feb68 to 4Feb69, "End of Tour Report," n.d., p. 3, included as Tab 42 of Fuller, ed. "End of Tour Reports," 15Apr70.

If the Army was uninformed or uneducated about the support AWS was decreed to provide it, much of the responsibility could be laid at AWS' doorstep. Most of AWS' people assigned to Army support in Vietnam had no training or experience with the Army or its operations. With the one-year tour in effect in Vietnam, many were not eager to absorb themselves totally in supporting the Army because it took too much of their tour to get acquainted and comfortable with the Army way of life; rather than expend the necessary effort and not be around to reap the fruits of their labors, they went through the motions until they could get back stateside in the mainstream of Air Force life. "I doubt if AWS makes an adequate effort to find out what the Army is all about," reported Lieutenant Colonel William E. Cummins, II, the 5th Weather Squadron commander in 1969, in offering further insight into the phenomenon. Cummins spent much of his AWS career before and after 1969 associated directly or indirectly with Army support, including a tour with the 7th Weather Squadron in Europe, and was intimately knowledgeable about the topic. "If we do not understand Army operations," he continued,[161]

> we will have very limited success in identifying weather requirements. Pushing the experience clock back to '62-'65 period, I offer the reason why we were not getting the job done at the time. A number of AWS officers assigned to the 7th Wea sq, especially SWO's [staff weather officers] in sensitive positions, felt that their tour with the Army put them on the "second team." Their general concern was, "when do I get back to the Air Force." With such a perspective they had little incentive to learn the Army language, no enthusiasm to learn the Army well enough to identify weather requirements, and very importantly, they were not inclined to establish the rapport needed to get the job done.

"We don't see the real Army tactical combat mission," echoed Colonel Keith R. Grimes. An expert in weather support to Army Special Forces, Grimes went on to say in an interview that,[162] *

> We have never welded our support to say, "Okay, these are the things we can provide you. These are the ways your operations are impacted and these are the ways we can reduce the impacts." We sit on the flight lines and we think: "This is Army support"--when it's only a very peripheral mission . . . . You've got to really understand the role, say, of a mechanized infantry brigade and their combat tactics, before you can figure out what it is meteorologically that influences them one way or another, and how this can be reduced for them. How many people in Air Weather Service can tell you what an airborne brigade's concept of operation is, how its tactics unfold; what an armored cav unit does in combat, where its significant weather impacts are? . . . [AWS] hasn't rooted out these missions.

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*Jump qualified, and certified as a forward air controller, Grimes worked with Army Special Forces during numerous exercises stateside, and in the Dominican Republic during the crisis of 1965; set up a weather observing and reporting network in northern Laos in 1965 to support air operations in Southeast Asia; and served as the Air Force liaison officer to the Army--and was the project weatherman--for the daring raid on the prisoner of war camp at Son Tay, North Vietnam, in 1970.

These problems, and others, were formally identified in AWS' input to an Air Force project in the late 1960s and early 1970s designed to evaluate the effectiveness of airpower in Southeast Asia and document the lessons learned. Initially, it was difficult to make accurate tactical forecasts, particularly for engagements in forward battle areas with company or battalion-sized elements that did not have AWS weather observing teams attached to provide vital observations. USMACV suggested to the Department of the Army in mid-1966 that, in accordance with the joint regulation, the Army furnish the weather observers needed forward of division headquarters,[163] and one of the more profitable solutions was for the 1st Weather Group to train men from the Army's 5th Special Forces Group (Airmobile), who were strategically deployed throughout the theater, to take and relay basic weather observations.[164] * Supplies and equipment authorized by division or brigade TOEs were often unavailable or in short stock, the staff weather officer to the 1st Cavalry Division (Airmobile) writing in 1966 that "the Army had very little to give their own and consequently we received the same."[165] Even when AWS units got what they were authorized, and the facilities furnished by the Army were adequate, life with the Army did not measure up to the comforts enjoyed by sister AWS units supporting the Air Force in Southeast Asia. Rank carried more weight in the Army than in the Air Force, thus making it difficult for AWS enlisted men at brigade level, or company-grade officers at division level, to compete for services, supplies, and facilities. Most of the Air Force tactical weather observing equipment used was too sophisticated for continuous use and, because of its complexity, required maintenance support that was unavailable in the field. The AN/MMQ-2 tactical meteorological station, and the AN/TMQ-14 and AN/TMQ-25 tactical ceilometers, were examples of equipment that proved impracticable in Vietnam, while older, cheaper, and more basic gear like the AN/PMQ-1 and AN/PMQ-4 manual meteorological stations of Korean War vintage were more reliable in theater tactical operations.

"We had a jolly time trying to live with the Air Force system of centralization in an Army environment," reported Colonel Cummins, the 5th Weather Squadron commander, because "the Army is quite decentralized."[166] At each Air Force base a single "housekeeping" unit was responsible for things like personnel matters, housing, messing, etc., while each unit of any size at an Army post had its own dining hall, quarters, motor pool, etc. Since a weather unit was assigned by Air Force orders to a specific installation, a problem arose as to which Army unit would provide it messing, billeting, supply, and administrative support. In addition, Army units supported by AWS moved too often within their corps area for official Air Force movement orders to keep up. Since the Army used a single Army Post Office (APO) number for their address it did not matter where they were located; but each time the AWS unit moved with them it took three or four months for official orders to be processed and in the meantime, official correspondence was misrouted and supplies forwarded to the old location were lost, in many cases. Through all the inconveniences, hardships, and hazards, however, the morale among the weathermen supporting the Army was excellent, and it was due mostly to actually being exposed to combat.

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*Ironically, after some of their detachments sustained heavy casualties because weather precluded their being exfiltrated by helicopter or receiving close-air support, most Army Special Forces units paid closer attention to the 1st Weather Group's forecasters. See Col Francis J. Kelly, U.S. Army, *U.S. Army Special Forces: 1961-1971*, from *Vietnam Studies* (Washington DC: Dept of the Army, 1973).

Checking the hourly weather log beside an AN/MMQ-2 observing van surrounded by a revetment of sand-filled oil drums is Sgt Michael Connell, a weather observing team chief assigned to OL-2 of 5WS's Det 31 at Phuoc Vinh, working in support of the 1st Cavalry Division's (Airmobile) 1st Brigade in 1968. Atop the van is Sgt Bernard L. Brezee, relaying weather data via HF radio to unit headquarters. "We get a very deep sense of satisfaction working with the 'Cav,'" Connell was quoted when asked how it felt being stationed with the division in 'Nam, "because it is a division noted for its success against the enemy" and "the information we obtain and pass on plays a vital role in the planning of each operation." (USAF Photo)

At Phu Loi, Republic of Vietnam, in September 1968, Lt Col Cummins (left) discusses AN/TMQ-14 tactical ceilometer with Col Ralph G. Suggs, the AWS vice commander. (USAF Photo)

Paradoxically, three of the four AWS weathermen that were killed in action in Vietnam (all enlisted men) were assigned to 5th Weather Squadron units supporting the Army, as were the majority of those weathermen wounded in action.[167]

Communications

Of all the problems facing weathermen supporting the Army in Vietnam, the most serious involved communications. In addition to the problems discussed above associated with support to the 1st Air Cavalry Division (Airmobile), common-user telephone circuits between brigades and divisions were often out of order. Dedicated Army command-and-control circuits between brigades and divisions were available when the action was light, but when the fighting intensified weather information was preempted by higher-precedence traffic. Terminal teletype equipment and circuits at division base camps were frequently out of commission. And power sources were often unstable or generated fluctuating power.[168]

Although the joint regulation stipulated that the Air Force would provide long-line weather communications, in Southeast Asia it was the Army's responsibility for providing, operating, and maintaining all long-haul circuits. Long-lines were prone to corrosive failure in the humid and salty air of Vietnam, and were also subject to cuts by the enemy or by vehicular traffic. The major problem in weather teletype circuit outages was isolation of the affected areas.[169]

With the buildup of United States forces in Southeast Asia in 1965-66, existing sixty word-per-minute teletype circuits could not handle the increased traffic volume. They were cited as a deterrent to mission accomplishment by both Pacific Air Forces (PACAF) and Air Force inspector general teams in early 1965 and 1966. Formal paperwork to upgrade the circuits and terminal equipment to a 100 word-per-minute capability, including those with AWS units supporting the Army, was initiated by the weather squadron in Vietnam in early 1965. It was September 1970 before the 100 word-per-minute teletype system in Vietnam was completed, just as the Army was beginning to go home.[170] Considering that the United States was involved in World War I for about a year and a half, in World War II for a little over three and one-half years, and for three years in Korea, the five-year reaction to such a critical tool as communications--the life blood of military meteorological service--was a trifle excessive.

In August 1966 the 5th Weather Squadron formally expressed a requirement for a facsimile capability at its units down to operating-location level in support of the Army's fixed airfields and division base camps. Again, the first circuits and machines were installed in 1970, just as the Army was going home. Inside a year, therefore, efforts began to remove the facsimile equipment.

An analysis of the facsimile and teletype-upgrade efforts in Southeast Asia uncovered several shortcomings in weather communications concepts and support in a combat arena. AWS' weathermen were spoiled by peacetime niceties such as 100 word-per-minute teletypes and full facsimile service to the point where many believed they could not provide adequate service to the Army in a combat theater without them. Yet in the case of facsimile at Army sites, for instance, their opinions vacillated--due in part to the one-year tour policy whereby the opinion of a particular 5th Weather Squadron detachment commander differed from that of his predecessor and, or, his successor. In early 1969, in taking a position opposite that of the commander he succeeded, Colonel Cummins believed that his 5th Weather Squadron units could meet the Army's combat support requirements without facsimile. His boss, the 1st Weather Group commander, took exception but, in turn, his boss, the 1st Weather Wing commander, aligned himself with Cummins![171] Nor was the Army immune from wavering policy. A lieutenant colonel at USARV kept assuring Cummins that the Army would provide 100 word-per-minute teletypes on a permanent basis, while to his Army superiors in Hawaii and Washington he indicated that the weather teletypes would be on a "temporary loan."[172] The formal process for acquiring weather communications service was cumbersome and unresponsive due to the degree of "coordination" required. It was not uncommon for a weather communications request to have been "coordinated" at four or five different echelons within seven or eight various commands or services. Adding needless confusion, whether by design or accident, was the vague, confusing, cryptic, and contradictory language used in the formal weather communications requests. It was the basis for the Army's considering the entire weather teletype issue (in particular maintenance) an Air Force responsibility--a position agreed to by the Air Staff over the repeated objections of the Air Force Communications Service (AFCS). And finally, the Army in Vietnam, and the 5th Weather Squadron units supporting it, simply moved too frequently for the inflexible communications request process to keep pace. It led to pleas by Air Force communications agencies to clamp a "mandatory freeze" on changes to basic requests, and one by AFCS' Pacific unit for AWS to "stabilize" its Army weather communications support requirements in Vietnam.[173] The pleas fell on deaf ears. AWS was determined to support the Army, and the Army units moved often.

CHAPTER 3 - ARMY (AND AWS) ORGANIZATION, 1970s

As the 1970s dawned, and the United States presence in Vietnam subsided, AWS could look back on some three decades of supporting the Army, through three shooting wars, and conclude that it still faced numerous perplexing problems with that portion of its mission, many of which had become traditional in nature. The fundamental question was who should provide the support, the Army or the Air Force? There were still enough--within the Army and on the Air Staff and in AWS--who thought the Army should, to keep the issue alive. If it was to continue to be AWS, then AWS saw a problem--as it had from at least 1943--in getting the Army to formally state its requirement for weather support. The Army thought it had; but changes in tactics and weapons and organization sired new requirements, and there were differences in its requirements between peace and war, garrison and field, units stateside and overseas, and between functions. The Air Force sought to apply manpower standards; yet the role (and, hence, its composition and weather support requirements) of an armored cavalry regiment in Korea differed from one in Germany or at Fort Hood. An airmobile division required support apart from that needed by an infantry or airborne division, and how was the rising role of Army aviation to be handled? Through the endless succession of drawdowns through the years, and on the horizon, where would the manpower come from to support mushrooming Army requirements? Should AWS' policy continue to treat Air Force weather support requirements first and the Army second? Pertinent directives were habitually out of date, in particular the joint regulation, and there were problems in streamlining procedures for updating them. The directives needed to specify clearly who was to provide and maintain weather communications gear at each echelon of Army support; who was to furnish the administrative and supply support to AWS personnel supporting the Army, and who was to provide the meteorological equipment needed. There was a lack of coordination between AWS and the Army over research and development and the acquisition of meteorological equipment for Army support. There was disenchantment by AWS personnel assigned to support the Army--such problems as life in the field, career progression, and the belief that the Army was more formal and rank conscious than the Air Force. There was the ongoing problem of having to educate key personnel of both the Army and AWS on the need and use of weather support. How, where, and when would AWS' centralization and computerization concepts dovetail with or enhance Army weather support? Lastly, how should AWS organize to support the Army? Should there be a weather wing devoted exclusively to Army support? Should AWS organize its support of the Army on a geographical or functional basis, or should it continue with a mixture of the two?[1]

To provide adequate weather support to Army elements, AWS personnel had to have more than a passing familiarity with the Army's basic organization. Because of sundry influences, the Army of the 1970s was changed. Like the Air Force, its organizational structure was affected by the shrinking defense dollar, the ominous Russian threat, advances in technology, a changing social fabric at home, the all-volunteer force in the "zero-draft" era, the total force concept, and the need to have a strategic striking force ready to meet United States commitments on a world-wide basis. Tight budgets forced the Army to shorten and consolidate training courses (it provided all basic helicopter training for Air Force personnel), close bases, stabilize tours, and cut back support forces and streamline its headquarters structures to increase its "teeth-to-tail" ratio.

The Army was completely reconfigured in the 1970s. Its two major elements were the Department of the Army headquarters and the field commands. The headquarters component consisted of two parts: the secretary of the Army and the Army staff. During fiscal 1974-75, the Army staff underwent a major reshuffling, lopping off some 1,300 spaces. In the same period, as discussed below, the headquarters of seven major Army field commands, or Army component commands of unified commands in specific theaters, were eliminated. Headquarters manning levels worldwide were cut eighteen percent, by nearly 5,000 spaces, as the Army, under a congressionally imposed active-duty military strength of 785,000 men, sought to raise and equip a 24-division force--16 active Army divisions and eight reserve.[2]

To provide for Military Occupational Specialty (MOS) areas where applicable, Army officer personnel and units were identified by branches. Branches were grouped into combat arms, combat support, and combat services support. The combat arms (infantry, armor, artillery) were those branches whose primary mission was combat. The engineers, Intelligence, and Signal functions were combat support branches. The combat services (Quartermaster Corps, Ordnance Corps, etc.) were those branches whose primary mission was combat service support and, or, administration of the Army as a whole. Certain branches had primary missions in both fields. In reductions the services were not sacrosanct either.[3]

Army Met Function

With the advent of the 1970s, the Army had people involved in its meteorological function at nearly every echelon of command, from small field units to the Department of the Army staff. It was a confusing arrangement for many AWS people because, unlike AWS, which was basically the single manager for all operational meteorological activities in the Air Force, the Army's meteorological elements were spread horizontally through its organizations. No single organization had responsibility for all Army meteorological activities; numerous agencies and functions had a piece of the pie.

Dept of Army Staff

At the Department of the Army, six staff functions influenced all Army meteorological activities--personnel, equipment, research, development, testing, and evaluation. The Assistant Chief of Staff for Intelligence (DA/ACSI) had general staff responsibility for Army meteorological activities, and served as the focal point for all Army operational met activities, including AWS support to the field army. That responsibility was handled primarily by a lieutenant colonel. Under the Chief of Research and Development (subsequently redesignated as the Deputy Chief of Staff for Research, Development, and Acquisition) was an office manned by two meteorologists who were the action officers, respectively, for meteorological research (Mrs. Frances Whedon, a very familiar name in AWS circles, as discussed below) and development. In the late 1960s the Assistant Chief of Staff for Communications and

Electronics (DA/ACSC-E) assigned communications frequencies for all electromagnetic systems used by all Army meteorological units--a responsibility assumed by the Army Communications Command in the 1970s. The Assistant Chief of Staff for Force Development (DA/ACSFOR) in the late 1960s, and then the Deputy Chief of Staff for Research, Development, and Acquisition in the 1970s, was responsible for long-range planning which influenced what new met equipment and systems would be developed and how much money would be used to equip the field army with new gear.[4]

AWS had no liaison people assigned with, nor did it have direct access to, those Department of the Army staff elements. AWS' channel to them on key matters like the joint regulation was through MAC to the Air Staff. Until the summer of 1978, the Air Staff focal point for meteorological matters was the office of the assistant for weather (AF/PRW), Deputy Chief of Staff for Programs and Resources, (AF/PR). A reorganization of the Air Staff in mid-1978 abolished the AF/PRW office. Its function was transferred to the Deputy Chief of Staff for Operations, Plans and Readiness (AF/XO), Headquarters USAF, where one officer, a lieutenant colonel (with the office designation of (AF/XOOTF) began shouldering the workload formerly handled by four, including three colonels.[5] The Army staff dealt directly with AF/PRW or AF/XOOTF; indirectly with AWS.

AF/PRW was headed by a colonel with a weather Air Force Specialty Code (AFSC), meaning he had spent most of his Air Force career within AWS. The AWS commander, with the concurrence of the MAC commander, nominated individuals for the AF/PRW position, but the Air Staff's Deputy Chief of Staff for Programs and Resources, a three-star general, had final approval authority. He controlled the billet, and he was AF/PRW's reporting official. That command relationship was an important one because, due to different personalities and experience and points of view, the AF/PRW stance on weather support to the Army--and other matters--was not always in gee with the AWS commander's[6]--as issues addressed below vividly demonstrate.

Artillery Met Sections

The biggest meteorological units in the field army were the artillery met sections--about seventy of them were scattered throughout the world and at their technical headquarters at the Army Artillery and Missile Center at Fort Sill, Oklahoma. That center was a part of Continental Army Command (CONARC), headquartered at Fort Monroe, which had the responsibility for training people and developing field procedures for Army equipment.[7] Through its 16th Weather Squadron, and then its 5th Weather Squadron, the 5th Weather Wing operated a detachment at Fort Sill, but it was primarily involved in supporting Army aviation at the airfield there.

AMC's (DARCOM's) ASL

Most research, development, testing, and evaluation in the Army was done through the Army Materiel Command (AMC), which was one of the Army's major field commands, with headquarters in Washington, DC. The Army Materiel Command was redesignated as the United States Army Materiel Development and Readiness Command (DARCOM) on 23 January 1976.

Under the Army Materiel Command were several commands, centers, laboratories and facilities, many of which had Army meteorologists assigned. Perhaps the most important subordinate unit of AMC, from the standpoint of meteorological research and development, was the Atmospheric Sciences Laboratory (ASL) of AMC's United States Army Electronics Command.*

Formed in 1965, and originally located near Fort Monmouth, New Jersey, ASL also had major offices at Fort Huachuca, Arizona, and at the White Sands Missile Range in New Mexico. The workload from ASL's meteorological research and development mission was about evenly divided between Fort Monmouth, White Sands, and Fort Huachuca. Through Army meteorological teams working under the Electronics Command's Meteorological Support Activity at Fort Huachuca, ASL also provided met service to all Army research, development, test, and evaluation activities[8]--a mission similar to AWS' 6th Weather Wing which supported Air Force research and development activities.

In point of fact, for that reason AWS support to Headquarters AMC was furnished by Headquarters 6th Weather Wing--until late 1971 when the responsibility was transferred to the 5th Weather Wing. The 5th Weather Wing, or units subordinate to it, retained that responsibility through 1978.† Yet because AWS had no charter for involvement in Army research and development, support to AMC was wispy. It was generally handled by a single officer on an additional-duty basis. Service was tendered when AMC asked for it. For the most part, AWS kept the channel to AMC open to stay abreast of the Army's research and development activities.

Headquarters ASL moved to the White Sands Missile Range in the 1970s. AWS did not maintain a unit at White Sands, and until November 1971, it did not have a unit at Fort Huachuca either. When ASL headquarters was at Fort Monmouth, AWS liaison was furnished on an additional duty basis by Lieutenant Colonel Malcolm Reid, who commanded an operating location there under the 16th Weather Squadron--until May 1971, when it was transferred to the 5th Weather Wing.**

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*The Army's Electronics Command succeeded the old Army Signal Corps--a unit quite dear to AWS because AWS' commonly accepted birthdate was 1Jul37, when the mission of providing weather service to the Army air arm was transferred from the Army Signal Corps to the Army Air Corps. The Electronics Command was reorganized, effective January 1978, to form three new commands: U.S. Army Electronics Research and Development Command (ERADCOM), Communications Research and Development Command, and Communications-Electronics Materiel Readiness Command.

†OL-G, 5WW, was established at Fort Belvoir on 1Sep71 to support the Army's Combat Development Command (USACDC). Commanded by Lt Col Malcolm Reid, the unit's mission also included tendering meteorological support to HQ AMC on an additional-duty basis when it was asked for. Before then, support to HQ AMC had been handled by HQ 6WW on the same basis. On 15Jul72, OL-G became OL-H, HQ AWS, at Fort Belvoir. OL-H retained the responsibility of supporting HQ AMC until, with USACDC's demise on 1Jul73, OL-H was inactivated and the responsibility for supporting HQ AMC was through HQ 16WS and its Det 2 at Fort Belvoir. When 16WS was inactivated on 1Oct76, the responsibility for supporting DARCOM (formerly AMC) was transferred to Det 2, 5WS, 5WW, at Fort Belvoir--which discharged that duty, on an as-required basis, through 1978.

**Until 1Sep70 it was designated as OL-8, 16WS, at Fort Monmouth. Afterward, it became OL-F, 16WS, and remained so until 1May71, when it

On 15 November 1971, when the Army transferred the Combat Developments Command's meteorological function from Fort Monmouth to Fort Huachuca, the AWS operating location at Fort Monmouth moved to Fort Huachuca also, as discussed below.

USACDC

With headquarters at Fort Belvoir, Virginia, the United States Army Combat Developments Command's (USACDC) mission was to study and recommend how the Army would fight, be organized, and be equipped. Documents produced by it and its subordinate elements provided the authority to develop new meteorological equipment.[9]

Until September 1971, AWS furnished liaison support to Headquarters USACDC through the commander of Detachment 2, 16th Weather Squadron, at Fort Belvoir. The detachment's mission included support to the Military District of Washington, the Army Materiel Command, and to Army aviation at Davison Army Airfield where it was actually located. On 1 September 1971, because of the detachment's physical separation from Headquarters USACDC, AWS established Operating Location G of the 5th Weather Wing at Fort Belvoir for liaison with Headquarters USACDC, the Army Materiel Command, and USCADC's Intelligence and Control Systems Group (USACDC-INCSG).

Command of Operating Location G was assumed by Lieutenant Colonel Malcolm Reid who moved to Fort Belvoir from Fort Monmouth, replacing Lieutenant Colonel Marion L. Hershberger who was transferred to Fort Huachuca. In the late 1960s Reid had served with the 7th Weather Squadron in Germany as staff weather officer to V Corps. As it had been at Fort Monmouth, Reid's work was extremely critical to the doctrinal aspects of AWS' Army support mission. He was responsible for managing the development within USACDC of all conceptual, doctrinal, and materiel aspects of the Army's weather support requirements--including weather satellites, weather communications, weather modification, computers, tactical weather equipment, weather TOEs, weather studies, and weather support manuals and regulations and other doctrinal literature.[10] On 15 July 1972, Operating Location G became Operating Location H of Headquarters AWS, at Fort Belvoir, and it retained that designation until, with USACDC's demise the previous month, it was inactivated on 1 August 1973. Reid retired from the Air Force that summer after doing an outstanding job in his liaison role with the Army through USACDC.†

Met Function to Ft Huachuca (Intelligence)

Effective 15 November 1971, the Army's meteorological function at Fort Monmouth, under USACDC's Communications Electronics Agency, was transferred to the Intelligence Agency (USACDC/INTA) of USACDC's Intelligence and Control Systems Group at Fort Huachuca.[11] Later, in

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**(Cont) was redesignated as OL-A, 5WW. OL-A, 5WW, remained at Fort Monmouth until 15Nov71 when it was relocated to Fort Huachuca.

†Col Leonard V. Gillespie, one-time commander of the 7th Weather Squadron who spent much of his AWS career in Army support, singled out Reid in early 1972 for his yeoman work in getting meteorological requirements into Army concept and doctrine statements. Gillespie believed that Reid's inputs to Army documents would have a great impact

1973, USACDC/INTA became the United States Army Intelligence Center and School (USAICS), at Fort Huachuca, and it retained that designation through 1978. For years the chief meteorologist at USAICS was Mr. James D. Rustenbeck, who made many contributions to Army meteorology.

The 5th Weather Wing's Operating Location A at Fort Monmouth, under Lieutenant Colonel Reid's command, which had been supporting the Army meteorological function with USACDC's Communications Electronics Agency, was also moved to Fort Huachuca, effective 15 November 1971, to continue that support. Between November 1971 and October 1976, the unit's formal designation changed twice, but then reverted to the original one of Operating Location A, 5th Weather Wing.* It retained that designation and remained at Fort Huachuca through 1978.

As mentioned above, Lieutenant Colonel Reid did not go to Fort Huachuca with Operating Location A; instead, he transferred to Fort Belvoir to command the operating location there and serve as liaison officer to Headquarters USACDC and its Intelligence and Control Systems Group. Commanding Operating Location A at Fort Huachuca from 15 November 1971 until late 1972 was Lieutenant Colonel Marion L. Hershberger, the man Reid replaced at Fort Belvoir. Hershberger was followed by Lieutenant Colonel James C. Owens, who held the position until he retired from the Air Force and was succeeded, as of 1 September 1976, by Lieutenant Colonel Owen Y. Macy. Macy retained command of Operating Location A at Fort Huachuca through 1978.

Acting as liaison between AWS and USACDC/INTA (or USAICS), and between AWS and the Atmospheric Sciences Laboratory's office at Fort Huachuca, Operating Location A's mission was also very critical to AWS' support of the Army. It encompassed preparing USACDC studies involving concepts for AWS support of tactical Army operations, Army requirements for tactical weather support, and AWS requirements for Army tactical communications, logistical, and administrative support; providing inputs to USACDC combat development studies, troop tests, and field evaluations; and reviewing and preparing Army field manuals on weather support, Army regulations, and TOEs based on approved USACDC concepts and doctrine.[12]

CACDA, Ft Leavenworth

After the combined arms segment of USACDC's mission was transferred from Fort Belvoir to the Combined Arms Combat Development Activity (CACDA) of TRADOC (Training and Doctrine Command) at Fort Leavenworth on 1 July 1973, AWS established Operating Location E of the 16th Weather Squadron at Fort Leavenworth, effective 1 August 1973, for liaison to CACDA. The liaison role of the Fort Leavenworth operating location was every bit as important to the doctrinal phase of AWS' support to the Army as was Operating Location A at Fort Huachuca, and as had been Lieutenant Colonel Reid's unit at Fort Belvoir. Operating Location E was under command of Lieutenant Colonel

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†(Cont) on the shape of AWS' support to the Army for years to come. See memo for record, and 3 atch, Col William E. Cummins, II, asst DCS Ops, HQ AWS, "Army Support Forum," 21Apr72, p. 3.

*OL-A, 5WW, became OL-D, HQ AWS, at Fort Huachuca, effective 15Jul72. On 1Aug73, OL-D, HQ AWS, became OL-A, 16WS, at Fort Huachuca, and retained that designation until 1Oct76, when 16WS was inactivated and the jurisdiction of OL-A reverted back to 5WW.

Dell V. McDonald from 1 August 1973 until 13 August 1976, when he was reassigned to Headquarters MAC. McDonald's replacement was Lieutenant Colonel Darrell T. Holland, who retained command of Operating Location E through 1978.

TRADOC and FORSCOM, 1973

In a major reorganization of its field command structure, the Army, effective 1 July 1973, replaced its Continental Army Command (CONARC) and its Combat Developments Command (USACDC) with the Training and Doctrine Command (TRADOC) and the Forces Command (FORSCOM) at, respectively, Fort Monroe, Virginia, and Fort McPherson, Georgia. TRADOC and FORSCOM were both commanded by four-star generals. The reorganization was made in the hope of improving readiness, management, schools, and combat development activities. It was also made to reduce the number and size of headquarters, to cut back support units, and to eliminate activities of marginal utility to produce manpower for three new divisions--the 7th and 24th Infantry Divisions, and the 5th Infantry Division (Mechanized)--at no overall increase in the Army's authorized manpower. CONARC personnel formed the nucleus for TRADOC, and personnel from the Third Army at Fort McPherson, which was dissolved and consolidated under the First Army, formed FORSCOM's nucleus. The remaining three numbered armies stateside--the First, Fifth, and Sixth--were assigned to FORSCOM and assumed responsibility for all Army Reserve and Army National Guard units within their respective geographical areas. TRADOC's mission was individual training, education, and combat development, and it was given command of all Army training centers, service schools, combat development centers, and training oriented installations. FORSCOM served as the Army component of the United States Readiness Command (REDCOM), and its mission included land defense of the United States, and the training and readiness of all deployable active and reserve components stateside--to include corps, divisions, and their supporting forces.[13]

Most important of TRADOC's centers, from AWS' standpoint, was the Combined Arms Center of CACDA at Fort Leavenworth, discussed above, which oversaw both the Intelligence (USAICS--United States Army Intelligence Center and School) and Signal schools, located, respectively, at Fort Huachuca and Fort Monmouth. The Signal school was subsequently moved to Fort Gordon, Georgia.

To support the Army reorganization, AWS made some changes. Under its basic charter of supporting the Army stateside, the 5th Weather Wing's 16th Weather Squadron at Fort Monroe assumed the task of furnishing weather service to both TRADOC and FORSCOM. The squadron commander, a colonel, served as staff weather officer to the TRADOC commander, while a four-man operating location under the squadron at Fort McPherson, headed by a lieutenant colonel, served as staff weather officer to the FORSCOM commander. Because the missions of the three numbered armies were greatly diminished (dealing primarily with Army Reserve and Army National Guard matters), direct staff weather officer support to their respective headquarters was discontinued, and indirect staff support was provided them on an as-required basis by the nearest squadron unit until 1978. In 1978, a one-year test involved using mobilization augmentees from the Air Force Reserve as staff weather officers to the three numbered armies, but it was concluded that the workload was too much for one officer. As discussed above, Operating Location A at Fort Huachuca, supporting USAICS, was transferred to the squadron from Headquarters AWS.

The divergence in missions between TRADOC and FORSCOM, coupled with an increase in activity and geographical scope of responsibility for the latter command, soon presented span-of-control and management problems for the 16th Weather Squadron. As a result, AWS reactivated the 5th Weather Squadron (last inactivated in the Republic of Vietnam on 1 May 1972) under the 5th Weather Wing at Fort McPherson on 1 January 1975 to support FORSCOM.[14] For the first time, therefore, AWS had two weather squadrons stateside devoted exclusively to support of the Army, both assigned to the 5th Weather Wing.

The arrangement was shortlived, however. On 1 October 1976, under orders from the MAC commander to reduce itself by about 400 manpower spaces, AWS inactivated the 16th Weather Squadron--at a net savings of six manpower spaces! The 16th Weather Squadron's Operating Location A at Fort Huachuca, and Operating Location E at Fort Leavenworth, were assigned directly to the 5th Weather Wing; a third operating location, and the squadron's seven detachments, were transferred--together with the mission of supporting TRADOC--to the 5th Weather Squadron.[15] By 1978, with twenty subordinate units and 303 people assigned* the 5th Weather Squadron had grown into the largest of AWS' sixteen squadrons.

Activated also on 1 October 1976, at Fort Monroe, was Operating Location C of the 5th Weather Wing. It was commanded by the former 16th Weather Squadron commander, Colonel Walter R. Brett, who retained the mission of staff weather officer support to Headquarters TRADOC. The commanders of Operating Locations A and E reported through Brett to the 5th Weather Wing. Brett remained as Operating Location C commander until September 1978 when he was replaced by Colonel William E. Cummins, II.

Army Liaison To HQ AWS

For years AWS had been unsuccessful in efforts to get an Army liaison officer assigned to its headquarters, but by early 1977 the Department of the Army had relented, and directed TRADOC to assign one.[16] The officer selected was Lieutenant Colonel Charles J. Swayne, who assumed that duty at Headquarters AWS effective 1 July 1977. Swayne, formerly assigned as a deputy Intelligence officer at III Corps and Fort Hood, was assigned to TRADOC but reported directly to the Department of the Army as well as to the TRADOC commander. Within AWS, Swayne was directly responsible to the AWS commander. AWS found him to be a welcome addition to the staff.

Other

There were numerous other Army reorganization actions in the early 1970s, but none as significant to AWS as those highlighted above. For example, the Army Air Defense Command (ARADCOM) was inactivated; and, effective 31 January 1977, the United States Army Missile Research and Development Command and United States Army Armament Research and Development Command were established. Overseas,† other than the phase out of Army units and personnel from

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*Just eight less than the 311 people authorized AWS' smallest wing, 1st Weather Wing.

†The U.S. Army, Alaska (USARAL), and U.S. Army Forces Southern Command (USARSO) were also eliminated, effective 1Jul74, and control

Southeast Asia, the major change in the Army organization structure was the disestablishment of USARPAC (United States Army, Pacific) in Hawaii on 31 December 1974, and the activation there of the United States Army CINCPAC [Commander in Chief, Pacific Command] Support Group, USACSG. With USACSG's establishment, the requirement for staff weather support decreased significantly and was handled on an additional duty, part-time basis by officers from Headquarters 1st Weather Wing at Hickam AFB.[17]

Echelons Above Division (EAD), 1973

Another action by the Army, which was more a conceptual arrangement than a formal organization change, was its Echelons Above Division (EAD) decision of July 1973 which eliminated the field army and made the EAD corps (normally commanding two to five and two-thirds divisions--the two-thirds being an armored cavalry regiment and a separate brigade) the highest tactical element within any given theater of operations. The 16th Weather Squadron saw TRADOC and FORSCOM adopting new techniques to make up for the Army's inferiority in numbers of people and equipment (techniques that foreshadowed tighter control of divisions by the corps), and as a result, "it could be that weather support at corps can have more impact on decisions than in the past."[18] Whatever, weather doctrine set forth in directives such as the joint regulation were immediately antiquated by the EAD decision because, for one thing, it raised the question of who would be responsible for weather communications above and below the corps level. Before that, the weather team or unit at the field army level had been the key element between higher echelon weather centers (the Air Force Global Weather Central, for instance) and the AWS weather teams or units at corps and division level.[19]

Echelon Above Corps (EAC), 1977

In May 1977, Lieutenant Colonel Macy, from Operating Location A at Fort Huachuca, reported that the Echelon Above Corps (EAC) concept was receiving increasing attention by the Department of the Army, and that there was no approved Army doctrine for weather support to the EAC, although there were field army level organizations in both Europe and Korea. However, weather support doctrine could not be ironed out until the Army defined the EAC's function.[20] On 23 October 1978, the Department of the Army published a draft field manual for the EAC concept which it passed to TRADOC for guidance. Macy reported that the manual's weather support section was "very poorly done, with gross conceptual and doctrinal errors," which he planned to rewrite before TRADOC prepared the final doctrinal manual.[21]

An Army Met Service?

Through over three decades following World War II, there flickered a faint flame of hope within certain elements and echelons of the Army, as well as the Air Force, that the Army should furnish *all* of the

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†(Cont) of Army elements in Alaska and the Canal Zone reverted to FORSCOM. U.S., Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1975*, 93d Cong, 2d Sess, Pt 1, 1974, pp. 608-09.

meteorological service it needed, not just that provided for in the joint regulation--i.e., artillery, research and development, and soil trafficability and flood forecasting. It was AWS' belief, from the late 1950s through the early 1970s, that in the Army that school of thought was centered in the person of Mrs. Frances Whedon on the Department of the Army staff, and "certain highly placed personnel" within the Signal Corps.[22]

High-level Air Staff officials, periodically from the late 1950s through 1974, also objected to AWS' supporting the Army. In 1958 certain Air Staff officials opposed the idea, as discussed above; and in late 1971, the Air Force vice chief of staff, a four-star general, in a report of his trip to various Air Force units around the world, asked, "why should not [the] Army provide its own service?"[23] The question was passed to the Air Staff's Assistant for Weather (AF/PRW), who believed AWS' support to the Army was too extensive and who, according to the AWS vice commander, did not care whether the Army formed its own meteorological service.[24] In mid-1973, while presenting findings from its "wall-to-wall scrubdown" of AWS to the Air Force chief of staff, the MAC briefing team, led by the MAC commander who had ordered the "scrubdown," mentioned that MAC had considered the idea of transferring to the Army AWS' mission of supporting it--an alternative MAC was disinclined toward because it would require the Army to form a weather service. But the Air Force chief of staff believed AWS was devoting too many Air Force resources to the job, and he asked, "why are you supporting the Army" in the first place?[25] A few weeks later, in late July 1973, and again in late March 1974, the Air Staff's Assistant for Weather (AF/PRW) informed AWS officials that AWS "is one of the largest, if not *the* largest, giver of gratis support to the Army," a fact that concerned "the senior people of the Air Force [who] are wondering why they have to provide people [and] resources . . . to support another service." However, "as for the Army seeking to set up their own weather service," he continued, "we [the Air Staff] don't see that as a viable alternative."[26]

Despite pockets of disagreement among its senior officers, the AWS leadership, for the most part, likewise did not see an "Army Meteorological Service" as a viable alternative to the problem of supporting the Army adequately in the "Era of the Drawdown"--as one AWS commander, Brigadier General William H. Best, so prophetically tagged the decade of the Seventies. In 1970, for instance, the vice commander of the 1st Weather Group in Vietnam thought "both services would be better off if the Army provided the bulk of its own weather support."[27] "Further fragmentation is not the answer," Best responded.[28] In early 1972, following a trip to Europe, an officer from Best's staff relayed the opinion of both the 2d Weather Wing and 7th Weather Squadron commanders that AWS was furnishing mere "token support" to the Army in Europe, and that AWS should support the Army fully or get out of the business.[29] Best agreed that improvements were in order, and that AWS could do better if it had more resources; but he believed there were still people in the Army who wanted to create an "Army Meteorological Service," an idea he opposed, saying that "austerity and the money crunch [shortage] should be pushing us in the direction of *fewer* metro agencies, not *more*."[30]

Brigadier General Thomas A. Aldrich, General Best's successor as AWS commander in mid-1973, believed the time had come for the Air Force and AWS to assume *all* of the Army meteorological support mission. For one thing, there was a new Air Force chief of staff. He had informed the MAC commander that, in line with Defense Department instructions that the service chiefs cooperate to reduce the military's size. he would not be parochial when it came to consolidating like functions between the military's three branches.[31] Thus, Aldrich envisioned a "new era." Before Congress once more asked the Defense Department why it had three different services developing meteorological equipment, it was time for AWS to propose that the Army's meteorological research and development mission be transferred to the Air Force (the Air Force Systems Command's Air Force Cambridge Research Laboratories--AFCRL--and Electronic Systems Division--ESD) and its operational meteorological mission--to include artillery observations and soil trafficability and flood forecasting--be assumed by AWS. But the "*real* reason," he confessed to his staff, for making such a pitch, was that Mrs. Frances Whedon had retired in January 1971.[32] She had been the "chokepoint" on the Army staff whenever the idea surfaced of the Air Force assuming the entire Army meteorological support job. She believed the Army had the wherewithal to form the nucleus of an Army Meteorological Service that could handle all of the Army's requirements.[33*]

Indeed, the Army had a nucleus of people working in meteorology--over twice as many as AWS devoted exclusively to Army support! In 1968 approximately 3,000 men and women were engaged in meteorological service or support to the Army--some 1,100 Army people in 68 artillery meteorological sections (including 500 in Vietnam); 900 from AWS; and the balance were Army people on the staffs at various echelons devoted to training, combat studies, and research and development.[34†] By comparison, excluding the weather reconnaissance function in both services, the Navy had about 3,000 engaged in weather operations, and AWS had 8,100 people assigned--excluding the 900 engaged in Army support.

In the 1970s, like AWS, the Army meteorological function was pared by about one-third until, by October 1975, there were only 376 people in 26 Army artillery met sections.[35] Army funds for meteorological operations and supporting research were also trimmed. Yet, while its expenditures for meteorological operations were only about four-to-five percent of the Air Force's, the Army invested twice as many dollars as the Air Force did for supporting meteorological research--a fact that sometimes captured the eyes of Congressmen wanting to know why the Army sought funds in an area covered by other federal meteorological agencies.[36]

It was in late September 1975 that the new AWS commander, Colonel Berry W. Rowe, came face to face with the scope and influence of the Army's meteorological research and development function. The Army had invited him to a meeting of its Intelligence Advisory Group at Fort Huachuca to help resolve the issue of whether a division's command post (formally labeled the Division Tactical Operations Center--DTOC) would be given direct or indirect weather support by AWS, as discussed in further detail below. At the 5th Weather Wing's suggestion, an AWS tactical weather support concepts conference was convened at Headquarters AWS in mid-September, the purpose of which, among other goals, was to develop AWS' position for the Fort Huachuca meeting. Having been in command of AWS for just five weeks, Rowe used the conference to issue policy guidelines on the problem of Army support. He said AWS had to mesh its efforts in the tactical support area into one

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*Memo and atch Lt Col Malcolm Reid, staff weather officer to USACDC, to Col William H. Shivar, 16WS comdr, "Army Meteorological Activities," 20Mar71.

†The figures cited did not include Army personnel in Special Forces or aviation units in Vietnam who took limited observations on a part-time basis.

united effort; no longer could AWS afford the luxury of separate concepts, organization, and operations for Air Force and Army tactical support; and that AWS had to give equal and due emphasis to Army support.[37]

DoD Met Resources*

(Money and Manpower)

	Operations (Funds)			Supporting Research (Funds)			Manpower		
	AF	Army	Navy	AF	Army	Navy	AF	Army	Navy
FY70	157,340	8,318	44,206	4,960	9,868	2,305	10,125	1,199	2,804
FY71	167,089	10,975	40,284	3,200	9,057	1,335	10,039	1,154	2,896
FY72	148,449	8,745	34,839	5,425	9,164	1,325	11,099	970	2,695
FY73	143,947	6,113	35,926	4,625	8,525	1,370	10,417	597	2,465

The Fort Huachuca meeting was an eye-opening baptism by fire for Colonel Rowe in the Army support game, at which he was not only unable to carry the AWS position, but he decided to side with the Army meteorological research and development community--as manifested in its Atmospheric Sciences Laboratory (ASL)--instead of trying to subdue it or have it absorbed by the Air Force. The specter of an Army Meteorological Service arose and confronted Rowe at Fort Huachuca, but he decided AWS would remain neutral.

"Air Weather Service is fairly small now, and we've probably got as many people as we're going to get," Colonel Rowe informed his staff in early October 1975 upon returning from Fort Huachuca, and "therefore, it behooves us not to look for missions." He said that AWS would not get involved in a missions and roles fight with the Army over their possible development of an Army Meteorological Service. Moreover, he said that for at least five years, the Army had been talking about developing an automatic weather sensing capability for the battlefield. He favored it, he said, because it dovetailed with his tactical weather support concepts, and because it would save the Air Force from developing a similar system. "We need to help those people," continued Rowe, referring to ASL,[38]

> develop the right thing. . . . They're reading Army requirements, and Army requirements are different than Air Force requirements. . . . But if they can do it, why should we waste

*Figures in this chart were extracted from the fiscal 1971 (pp. 19, 36), 1972 (pp. 9, 45) and 1973 (pp. 11, 40) versions of U.S., Dept of Commerce, NOAA, *The Federal Plan for Meteorological Services and Supporting Research*. Except for fiscal 1973, the funds cited represent Total Obligational Authority (TOA) appropriated/approved by Congress. The fiscal 1973 funds were those requested by DoD. Funds are presented in thousands of dollars. In the case of the Navy, the manpower figures represent man-years of effort, since many functions were performed as part time tasks by personnel assigned to other primary jobs.

> Air Force money to do it? . . . It might be time to rethink the Army support area a little bit . . . and try to get the Army to do things which they can do best. . . . This is the direction I feel I must go.

Rowe was cautioned by his staff that such a policy might surface opposition at the Air Force Systems Command, that if AWS encouraged ASL to go all out with research and development on meteorological equipment it could possibly put AFSC's AFCRL out of business. Rowe countered by saying AWS and the Air Force must cooperate with ASL, and that it did not necessarily follow that such competition would spell AFCRL's end. "They've got a pot full of money," Rowe went on, referring to ASL;[39]

> I believe the people in the United States Army are honorable, well-intentioned people, contrary to some of the vibes [vibrations] I've gotten in Weather Service. . . . Maybe I need to write down firmly a policy statement along these lines. . . . It may be a little bit of a reversal of previous [AWS] policy, to some degree. . . . Looking at the future possible resources of the Air Weather Service it looks to be clearly the way to go. . . . Let's get them to develop something we can use, . . . even though it may be a Pinto [model Ford compact automobile] instead of a Cadillac.

A few months later, in early 1976, Rowe, by then a brigadier general, visited the Pentagon and, in trying to resolve some Army support problems, paid a call on intelligence officials at the Department of the Army. One was Mr. James M. Beck, a GS-13 from the Office of the Assistant Chief of Staff for Intelligence (ACSI), who was the Army counterpart to the Air Staff's Assistant for Weather (AF/PRW). An ex-AWS officer who held a pilot aeronautical rating, Beck was eager to attack the problems. On 11 March 1976, he paid a visit to the 16th Weather Squadron, which subsequently reported that, because of Beck, weather was receiving more attention at the Department of the Army level.[40]

The following month Mr. Beck met with TRADOC officials and proposed forming an Army Meteorological Service using Army weather personnel supporting artillery. Although TRADOC turned him off on the idea, Beck made reference to several shortfalls in Army weather support. Support to artillery was too slow, and artillery met sections were dependent on the 1940s-vintage AN/GMD-1 rawin sets; the Army lacked the capability to collect precipitation data for the engineers, and it had no weather radars; the lack of attention by the Army meteorological research and development community to user requirements resulted in unacceptable equipment and wasted dollars; regulations and directives were ambiguous and did not reflect current organization; and battlefield-scale, tactical weather forecasting was deficient, due in part to weather observations not being relayed.[41]

In the fall of 1976 Mr. Beck proposed the establishment of an "Army Meteorological Support System" that, (within the constraints of the joint regulation) would consolidate all Army meteorological research and development, and Army-provided meteorological support. It involved some 840 Army personnel engaged in the met function. After being briefed on Beck's proposal by his staff, Brigadier General Rowe viewed it as a threat to AWS' mission. "They're creating a foundation for an Army Meteorological Service," he cautioned them in early October 1976; "they're starting to organize." Rowe's chief of staff, Colonel Hyko Gayikian, did not see Beck's plan as ominous because most of the 840 spaces were employed below division, while AWS support was concentrated at the division level and above. But

Rowe, backed by his deputy for operations, Colonel Salvatore R. LeMole, saw 840 spaces as a sizeable force that, if properly organized, could threaten AWS. When queried by Gayikian, Rowe said he did not necessarily oppose an Army Meteorological Service per se, *if* his staff could convince him it was the way to go. Otherwise, it represented a duplication of effort that one day would culminate in a showdown between AWS and the Army.[42]

Army officials at TRADOC, CACDA at Fort Leavenworth, and USAICS at Fort Huachuca, were strongly opposed to Mr. Beck's proposed organization, according to a report from AWS' liaison officer at CACDA.[43] A year later, in August 1977, when the Army's Atmospheric Sciences Laboratory sought to expand the Army's role in operational weather support, that move was also beaten back, and the Army decided that it would only issue forecasts for research and development activities (by ASL) and for hydrological purposes (by the Corps of Engineers).[44] By late 1977, the Army had 585 people engaged in meteorological research and development with a $13,650,000 budget; in addition, it had 485 people in meteorological operations with a budget of $7,860,000.[45]

Having worked closely with Mr. Beck, Colonel William E. Cummins, II, the Air Staff's Assistant for Weather (AF/PRW) in early 1978, was of the opinion that Beck merely wanted to consolidate the various "cats and dogs" in the Army involved in meteorological research and development and operational support; he did not propose, nor did he want, an Army Meteorological Service that would supplant AWS' role.[46] Realistically, Beck did not see much likelihood for an Army Meteorological Service--and neither did General Rowe. "It's not an acceptable answer," the AWS commander responded when asked about the possibility in mid-1978; "neither one of us, the Air Force and the Army, can afford to go it alone in today's environment" because "the climate, politically and economically today, and for the foreseeable future, would prevent that from happening."[47]

Still, throughout 1978, the Army's Atmospheric Sciences Laboratory persisted with attempts to expand the Army's role in operational weather support. In connection with the XVIII Airborne Corps' efforts to integrate its weather support requirements into its exploitation of the Intelligence function on the battlefield, ASL became involved. It proposed that the Army assume the responsibility for forecasting mesoscale patterns (weather in an area from one to 100 kilometers square) for operational use because, in its opinion, AWS support did not measure up in the area,* and because the joint regulation did not expressly forbid such a role for the Army. Seeking to clarify the issue within the Army, Mr. Beck, from the Department of the Army, posted letters in July and December 1978 iterating Army policy that the provision of weather forecasts in support of Army operations was AWS'

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*ASL's opinion was not without foundation, as AWS had to admit, because AFGWC was cranked up to provide macroscale forecasts (areas greater than 100 square kilometers) and would not have a capability until the mid-1980s to furnish the Army tactical mesoscale forecasts. AWS position in 1978 was that it would not augment its weather observer force to take mesoscale observations in support of the Army and, in fact, was advocating that the responsibility to take observations below corps level be assumed by the Army. AWS supported the Forward Area Limited Observation Program (FALOP) and responsibility. "In my opinion," reported Lieutenant Colonel Macy, the AWS staff weather officer to USAICS, "ASL will request a reclama because they see the letter as a death blow to on-going ASL programs."[48]

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*(Cont) the Army's Remote Automated Weather Station (RAWS) to acquire mesoscale observations, as addressed below, but its position was that it would "not recommend that USAF R&D [research and development] agencies expend resources on unique Army needs." See position paper, Col Salvatore R. LeMole, DCS Ops, HQ AWS, "AWS Position on Delineation of Responsibilities for Satisfying Army's Requirement in the Mesoscale Range," 26Jun78, which is the second atch to ltr LeMole to 1WW (DO), *et al.*, "AWS Army Support Position Papers," 26Jun78--itself included as Sup Doc #65 in Vol 4 of "History of 5th Weather Wing," Jan-Jun78.

CHAPTER 4 - MANPOWER AND MANNING

By the 1970s there were two separate processes or systems by which AWS was authorized manpower to meet Army operational weather support requirements for peace and for war. Peacetime Army requirements were handled with formal Statement of Requirements (SORs) initiated by a particular Army unit, usually upon the advice of the unit's AWS staff weather officer. Once approved by the Department of the Army, the SOR was forwarded to the Air Staff--the Assistant for Weather, AF/PRW. After the SOR was sent to MAC and AWS for review, the Air Staff decided whether additional Air Force manpower was needed to satisfy the SOR, and where it would come from. For Army maneuvers or joint exercises, Army requirements for weather support were spelled out in appropriate operations plans and orders, and were normally met by AWS personnel authorized to meet Army peacetime requirements through the SOR process.

The AWS manpower authorized to meet Army wartime requirements was inextricably tied to the Air Force's Manpower and Equipment Force Packaging (MEFPAK) system--a computer-oriented system for establishing manpower and equipment standards for Air Force elements tasked in various contingency and war plans. In the Army's case, weather annexes to their contingency and war plans listed the support required of AWS. There were four aspects to MEFPAK: Unit Type Codes (UTC), mission capability statements, manpower requirements (Manpower Force Packaging system--MANFOR) and logistics requirements (Logistics Force Packaging system--LOGFOR). UTC was a five-character, alphanumeric code* approved by the JCS to identify a type or kind of force. UTCs were used by unified commands--and Army, Air Force, and Navy components thereof--to state their requirements for both combat and support forces in plans. The mission capability statement--what a weather support force could do, for instance, and where it could be employed--was included in the MANFOR for each AWS UTC. LOGFOR was one of two major subsystems of MEFPAK, which listed the equipment and transportation required for each UTC. For AWS' purposes, insofar as Army support was concerned, as discussed in more detail below, Army TO&Es and Modified Table of Organization and Equipment (MTO&Es) equated to AWS logistics requirements (LOGFOR) in the MEFPAK system. MANFOR was MEFPAK's second major subsystem, and it listed the manpower--by function, grade (officers only), and Air Force Specialty Code (AFSC)--for each UTC. It was anticipated that initial support in time of war could be met by AWS manpower resources allocated for peacetime Army support. But, because MANFOR authorizations usually outstripped the manpower AWS was authorized through the SOR process for peacetime Army requirements, it was necessary to designate AWS augmentees to meet the manpower authorized for each MEFPAK UTC. [1]

Peacetime Army weather support requirements, upon which AWS was authorized and allocated manpower through the SOR process, were traditionally grouped into two categories: garrison and tactical or field. Garrison requirements were normally met by AWS detachments at

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*The first two characters of a UTC indicated the functional breakout; e.g., all weather UTCs began with XW.

AWS was oriented to garrison support, at the Army airfield, as these 1966 scenes from the 2d Weather Wing depict. At the top is an AN/MMQ-2 mobile met van at Hohenfels Army Airfield, Germany.

At right, 7WS's SSgt Michael T. Hardyman passes latest weather observation to control tower operator at Bonames Army Airfield, Germany.

At left, at Hanau, Capt Robert W. Gossett, Jr, briefs Capt Lawrence J. Russack and CWO Marion D. Ewell of Company A, 503d Aviation Battalion, 3d Armored Division. (Photos by Maj William H. Quelch, Jr, USAF)

Army airfields, the main missions of which were to support Army aircraft operations. The detachment commander was the staff weather officer to the post and airfield commanders. For garrison requirements, AWS also had staff weather officers at the numbered army headquarters--CONARC, USACDC, USAREUR (United States Army, Europe), USARPAC (United States Army, Pacific), and USARAL (United States Army, Alaska). In theory, a field army was to be supported by an AWS squadron (its headquarters located with or near the field army headquarters) with an authorized complement of 41 men (5 officers and 36 enlisted), a reduction of 12 (5 officers and 7 enlisted) from the early 1960s. In practice, after Vietnam, only the 7th Weather Squadron in Germany and the 16th Weather Squadron at Fort Monroe (and the 5th Weather Squadron at Fort McPherson after 1974) were devoted solely to what could be termed field army support; in the case of Korea, Alaska, and elsewhere, that support was furnished by weather squadrons, or other AWS units, whose mission also included Air Force support.

Army tactical weather support requirements at corps, division, and brigade were handled by AWS weather teams--referred to in appropriate directives by the abbreviation WETM.* The weather team structure underwent a significant alteration during Vietnam. At corps and division level, in most instances, the weather teams were formally designated detachments or operating locations; at brigade level, the weather teams were not formally designated units, and they were manned with people attached to the parent AWS detachment or operating location but separately authorized. Weather teams at the various levels differed in size and composition (enlisted men and, or, officers; observers and forecasters) depending on whether the requirement of the Army unit supported was for full (observing, forecasting, staff weather officer) or partial (observing only, for example) weather support. Prior to Vietnam, full weather support was normally provided down to division level only. However, Vietnam sired the need for observing support down to brigade level--generally handled by 3-man teams of enlisted observers if it was an airmobile brigade, two observers if it was an airfield brigade, and four observers if it was an airmobile brigade airfield. At division level, the originally authorized, 6-man division weather team (an officer and 5 enlisted men) was increased by 1970 to 14 men--2 officers and 12 enlisted. But at the corps level, weather team (detachment) authorizations were pared from 23 (4 officers and 19 enlisted) to 14--3 officers and 11 enlisted.[2]

With the phaseout of Army units from Vietnam in the early 1970s there was a corresponding increase in Army weather support requirements stateside and in Europe. Unfortunately, it put AWS in a bind because, with the onset of the "Era of the Drawdown," it was grappling with a series of Air Force and MAC-directed manpower cuts. "In the manpower area, austerity is the word for the future," cautioned General Best, the AWS commander, in January 1971, while addressing the second in a series of Army weather support conferences; "some cuts will be effected in both [our] Army and Air Force support" manning.[3] Representatives from the 5th Weather Wing--and its 16th Weather Squadron--attending that conference recommended reducing the 14-man corps and division weather teams to 6-man teams, capable of expansion to full 14-man teams when needed for contingencies or combat. They faced menacing morale problems because they could not keep a 14-man team busy when the corps or division was in garrison.[4] At the request of AWS, the squadron and the wing formally submitted such a proposal later that same year which, if it had been implemented, would have saved twenty-four manpower authorizations.

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*The weather teams were referred to by various names during the years, including Organic Weather Team (OWT), Combat Weather Team (CWT), Weather Support Team, etc.

AWS wanted to use the manpower savings to meet Army SORs outstanding, particularly those for four divisions under USAREUR in Europe where AWS support was reported to be subpar.[5†] "It is the general belief of everyone I talked to," reported a Headquarters AWS staff officer following a trip to Europe in March 1972, that, because of insufficient manpower, "AWS is providing only 'token' support to the Army in Europe, especially in the field."[6] It was pointed out that: about one-third of the Army in the field was in Europe (215,000 troops), but that only about one-fourth of the AWS manpower authorized for Army support was servicing that force; the Army had 88.5% more aircraft in Europe than did the Air Force; there were 170 Army airfields and helipads in Europe, 21 of which AWS supported, including 9 with forecasting support; and that, by comparison, there were 21 Air Force bases in Europe, each provided forecasting and observing support by AWS. The AWS commander, Brigadier General Best, was apprised of the problem in person when he visited Europe four months later. His interim response was to direct the 7th Weather Squadron to solicit USAREUR emphasis on the need for Army control tower operators to maintain a stepped-up weather alert.[7 *]

In late May and early June 1973, the Air Staff informed the Army and MAC that it approved AWS' proposal to reduce corps and division weather teams stateside to six men while in garrison. It represented a major change to the Air Force's--AWS'--Army weather support concepts. The key feature was the establishment of what were termed "cadre" weather teams--those teams supporting each corps and division stateside in peacetime were authorized 6 people (2 forecasters and 4 observers--one officer and 5 enlisted men), to include a staff weather officer, while each division in Europe would have a 4-man (2 forecasters and 2 observers--one officer and three enlisted) "cadre" weather team authorized, which also included a staff weather officer. The variation in manpower authorizations was due to the fact that, in war in Europe, garrison operations would normally be discontinued and all support would be tactical; but stateside, when the corps or divisions deployed, garrison support would still be necessary. Garrison weather people would be cross-trained in the tactical support mission and used during peak tactical workload periods to augment the "cadre" weather teams and form a wartime weather team of fourteen people. When required, augmentees from "other" AWS units would maintain garrison operations. The "cadre" weather team concept saved six manpower authorizations, which were used to meet still another Army SOR. The Air Staff described the concept as "a more efficient use of manpower spaces," one that "will not result in decreased peacetime support and will enhance wartime, contingency and exercise weather support provided to Army units, particularly those in Europe."[8]

Under unrelenting pressure to reduce its manning further, AWS investigated the possibility of cutting more manpower spaces from the corps and division weather teams. Following a visit to the 16th Weather Squadron in September 1973, Brigadier General Aldrich, Best's successor as AWS commander, directed the squadron and his staff to

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†They were the 3d and 4th Armored Divisions, and the 3d and 8th Infantry Divisions.

*During his trip to Europe in July 1972, General Best was approached by some who were concerned that once they had Army support experience, most of their future jobs would be with the Army. Best directed his personnel shop to publicize his policy that Army experienced AWS personnel would not automatically continue in Army support unless they were volunteers.

look at the idea of cutting each team to three or four people, and establishing a "mobile cadre (centrally located, fully qualified unit) at one location ready for augmentation to the organic [weather] detachment that deploys."[9] To put the general's suggestion in context, it came immediately after the Army's EAD (Echelon Above Division) decision discussed above, and after the MAC commander's "wall-to-wall scrubdown" of AWS revealed that AWS support to the Army as a whole was equivalent in resources devoted (929 of the 6,913 AWS manpower spaces engaged in weather support were devoted to servicing the Army) to that provided a major air command. After a trip to Germany the following month, Aldrich wanted to know the status of a 2d Weather Wing request for additional forecasters in the Army Flight Support Center at Heidelberg, noting that more spaces seemed justified in view of the volume of Army aircraft traffic; on the other hand, he directed the AWS staff to look at the 7th Weather Squadron's utilization of its division weather teams (suggesting the possibility of putting one forecaster from each team in the Heidelberg center and having them deploy when needed), and proposed that AWS get a MAC manpower team to Europe to look at AWS' authorizations for Army support.[10] "I'm sensitive to this organic weather team business and not doing anything but training," the general informed his staff.[11] But in the 16th Weather Squadron's case, it was disinclined toward further reductions in division and corps weather team manning; instead, it launched a campaign to improve its support to the Army with what it had, noting a need for AWS to formulate concepts of operation because "after all these years of Army weather support we haven't truly developed them."[12]

Then in 1976, when the Army switched "proponency" for weather team TOE (Table of Organization and Equipment) support from Signal to Intelligence, as addressed below, a proposal was floated to AWS to increase weather team manning to seventeen at corps and to nineteen at division.

On 7 April 1976, AWS asked CACDA (TRADOC's Combined Arms Combat Development Activity at Fort Leavenworth), through the joint Army-Air Force working group on Army weather support, to furnish information on the basic meteorological services needed by each type of unit from an armored cavalry regiment and separate brigades through division and corps. The information would enable AWS to prepare weather team UTCs (Unit Type Code) tailored for each type of Army unit supported. USAICS' (United States Army Intelligence Center and School, Fort Huachuca) work with the TOEs, in switching weather team support from Signal to Intelligence, became a springboard for UTC and other MEFPAK (Manpower and Equipment Force Packaging) revisions because they contained mission statements of the major Army tactical units, the criteria for the needed weather support, mission capabilities, work functions and locations, and TOE equipment.[13]

The basic work on the UTCs was completed by 5th Weather Wing,[14] which reported that "for the first time, AWS personnel resources were 'married' to Army resources listed on Army TOEs but dedicated to support AWS personnel."[15] The updated UTCs covered corps, divisions, separate brigades, and armored cavalry regiments.[16] Major changes in doctrine and operational concepts reflected in the revised UTCs included the Echelons Above Division (EAD) concept; the fact that "direct" (in-person staff weather officer, observing, and forecasting) support was necessary at each Army echelon addressed; that AWS personnel would operate and perform required operator maintenance on all TOE equipment authorized except HF radio teletype (Signal personnel would operate and maintain all HF radio assets); that two separate and independent modes of weather communications were needed--HF radio and multi-channel UHF; specifics as to Army equipment needed by weather teams at each level, including weapons and vehicles; and, most significantly, the requirement to support separate brigades and armored cavalry regiments and man all work centers (forecasting, observing, and observer-forecaster support) twenty-four hours a day.

7WS' A/3C Loid Lemelle works on weather van engine while A/2C Robert McKay and Capt James R. Chapman watch during exercise Grand Slam II in 1963. (U.S. Army photo by SP4 Franklin Mohler)

The provision in the proposed UTC rewrites for twenty-four hour weather service down to separate brigades and armored cavalry regiments was a crucial one because it meant that additional AWS manpower would have to be authorized at each level supported. The UTCs rewritten by the 5th Weather Wing represented requirements for 17 AWS people per EAD corps (5 divisions and 2 separate brigades), 14 per European-type corps (3 divisions and one separate operating element), 19 per division, and 7 per separate brigade and armored cavalry regiment.

The proposed UTCs, together with Intelligence TOEs drafted at USAICS, were sent by the 5th Weather Wing to Major Dell V. McDonald at CACDA. McDonald drafted CACDA's reply to AWS. Dated 2 July 1976, CACDA's letter contained the draft Intelligence TOEs and the proposed UTCs. In effect, the draft TOEs spelled out the missions and specific needs for weather support at corps, corps command posts, divisions (infantry, armored, mechanized, and airborne), division command posts, brigade command posts and division airfields, separate brigades and armored cavalry regiments, as well as the equipment authorized the supporting weather teams; while the UTCs fitted the Air Force--AWS--manpower needed to meet those requirements. However, CACDA cautioned AWS that the draft Intelligence TOEs had not been approved by the Department of the Army for implementation, and that when approved they might be "significantly different" when subjected to MTOE action and "unique" SORs (Statement of Requirements) for weather support.[17]

Through 1977 and most of 1978 nothing concrete became of the proposal to increase weather team manning. It was due primarily to the Army's lingering look at the role and composition of the Intelligence element at division level, as well as AWS' major policy proposal in December 1977 to chop off its support at the corps level--issues discussed at length below. It was November 1978 before the Army support UTCs were approved by MAC and the Air Staff.

Notwithstanding new UTCs, authorized corps and division weather team manning through 1978 was not uniformly altered from the "cadre" configuration outlined above, and experience with maneuvers and exercises bore out Army reservations about AWS' ability in the "Era of the Drawdowns" to bring the teams up to fourteen men during contingencies and wars. Originally, the Army was concerned that AWS' regional briefing station concept--designed to stretch withering manpower resources--would take away the people needed from base weather stations to bring the weather teams up to strength.[18] During an Army weather support conference at AWS in February 1974 the Army again raised the question, using the case of the XVIII Airborne Corps at Fort Bragg as an example.[19] While on a visit to Fort Bragg, Brigadier General Aldrich had been curtly informed by the senior commanding generals of the XVIII Corps and 82d Airborne Division about their misgivings with AWS' "cadre" weather team policy, and of their disbelief in AWS' promises of support in war. Eight months later, the joint working group on Army weather support discussed the fact that the fourteen-man weather team support concept had not been effectively evaluated because of unrealistic field testing and because the teams were never fully manned for exercises.[20] Despite Air Staff assurances that Army support would not suffer under the "cadre" weather team concept, the Army's concern stemmed from whether or not there were enough augmentees at "other" AWS units to balloon the teams to fourteen men. And as late as the annual Reforger exercise in Europe in the fall of 1977 there was evidence that, not only were there too few AWS augmentees to handle weather team assignments, some of them were too inexperienced in Army support to be of any value in a tactical situation.[21] Of the 4,720 manpower spaces authorized AWS in May 1978, 802 (17 percent) were dedicated to Army support.[22] A detailed examination by AWS in 1978 of reduced manpower available in base weather stations concluded that it would have problems meeting wartime requirements as long as peacetime manpower authorizations kept shrinking with no concomitant reduction in wartime tasking.[23]

The Army's apprehension was reinforced further when Lieutenant Colonel Swayne, their liaison officer to Headquarters AWS, visited 2d Weather Wing and 7th Weather Squadron units in Germany in November 1977 to assess AWS' support to the Army there. In a report filed with the Department of the Army, Swayne adjudged the garrison support to be acceptable, but the Army's tactical weather support requirements were not being satisfactorily met--one reason being that the 7th Weather Squadron's two-man "cadre" weather teams (operating locations) with the V and VII Corps needed beefing up.[24] After reviewing its weather team authorizations, the squadron's position in mid-1978 was that "we can live *today* with the four-man OWT [Organic Weather Team] at divisions and two-man OWT at ACRs [Armored Cavalry Regiment]," providing the Army's maneuver activity did not expand (an unlikelihood in view of the Army's increasing emphasis on readiness), but, "at corps the current manning is totally unacceptable."[25] It asked for two additional authorizations (a forecaster and an observer) for the V and VII Corps "cadre" weather teams. AWS validated the need and forwarded it to MAC for consideration in December 1978. In early 1979 MAC approved the additions,* bringing peacetime manning of the V and VII Corps

*As of August 1976, as addressed below, the Air Staff got involved with Army SORs only if they translated into additional Air Force manpower spaces over and above those authorized AWS for Army support at the time. Otherwise, MAC and AWS had the authority to rule on Army requirements.

"cadre" weather teams up to four people each. But in a sign of the times in the 1970s, the four extra manpower spaces came from so-called "lower priority" spaces already authorized AWS[26]--a case of robbing Peter to pay Paul.

A similar situation held true in Korea, where the Eighth Army represented the bulk of the Army's forces in the Pacific. In 1975 the Air Staff approved an Eighth Army Statement of Requirements (SOR) for organic weather teams with certain of its units. Headquarters Eighth Army at Yong San Reservation Army Installation was supported by a 23-man AWS detachment. The detachment served as a regional briefing station providing indirect forecasting support to a half dozen, two- or three-man "cadre" weather teams (operating locations) located with Eighth Army units through Korea. AWS determined in September 1975 that the observers then authorized the detachment, together with assigned staff weather officers, would be used to man the "cadre" weather teams--although in May 1977 AWS authorized two additional forecasters for the "cadre" weather teams at Camp Red Cloud with I Corps, and at Camp Casey with the 2d Infantry Division.[27] In June 1978, the Eighth Army submitted another SOR that included a request for direct forecasting support to the 2d Infantry Division (two additional forecasters) in addition to the original requirement for an organic weather team. Initially, because the status and strength of United States forces in Korea was under re-examination by the State Department and Congress, AWS and MAC balked at providing direct forecasting support to the 2d Infantry Division; while the 1st Weather Wing proposed using forecasters already assigned to Camps Casey and Red Cloud, ignoring the fact that they were authorized for the "cadre" weather teams. After the Eighth Army provided additional justification, MAC, on 27 October 1978, consented to assigning two additional forecasters at Camp Casey.[28] Some two weeks later a MAC Inspector General team visited AWS' detachment at Yong San and rapped AWS' knuckles because it found the unit incapable of supporting the Eighth Army and the 2d Infantry Division in war. It was not trained; it was not equipped; and it did not have the necessary organic weather teams. The inspection team recommended that AWS carefully reanalyze the way it structured and manned its Army support units in Korea.[29] Upon orders from the AWS and 1st Weather Wing commanders, the detachment, and its parent unit, the 30th Weather Squadron (also located at Yong San), studied the situation and concluded, in a report filed in December 1978, that support to the Eighth Army could be brought up to an acceptable level by some organizational reshuffling and by adding six manpower authorizations to the operating location at Camp Casey--including four enlisted forecasters for the "cadre" weather team.[30] They, like the two spaces a year earlier and the four for the 7th Weather Squadron in Germany, would have to come from manpower already authorized AWS for Army support.

Women in War?

With the death of conscription in 1973 (and the advent of the "all-volunteer" military force), and the increasing emphasis on equal opportunity programs within and without the military, coupled with attention to the so-called women's "liberation" movement, there was pressure in both the civil and military sectors to remove "for-men-only" job barriers and give the girls a fair shot. AWS, for example, in December 1973, much to the displeasure of General Paul K. Carlton at MAC, got its first female aircrew member in the thirty-year history of weather reconnaissance.[31] In 1976, following the Navy's lead, the Air Force accepted its first women pilot trainees, and a year later it entered its first women navigator trainees.[32*] In line with the other services, the Army increased the number of women used in each job specialty except for "Category I units--units whose mission was destruction of the enemy--or close combat support positions. The Army's policy was that women could be present forward of the brigade rear boundary, and that they would be employed to accomplish unit missions throughout the battlefield so long as the combat exclusion policy was not violated.

Air Force policy prohibited AWS from assigning women to positions where there was high risk of capture or injury due to enemy fire.[33] Thus, in February 1975, AWS issued a policy that women could be assigned to weather teams supporting the Army except: where parachute qualification was mandatory; where weather teams were used in combat; and so long as the percentage of women used did not exceed the Army's.[34] In essence, therefore, AWS women could be, and were, used in Army support except where it might actually entail combat. No AWS women were used to support the Army in Vietnam.

Weatherwomen in Army support: Sgt Susan J. Goodale (Det 5, 7WS, 2WW, Katterbach AAF, Germany), an observer augmentee to the 1st Infantry Division's staff weather officer, using AN/TMQ-22 to take an observation during exercise Wintex 77 in March 1977. (USAF Photo)

Parachutists Shortage

To meet the Army's weather support requirements in contingencies and wars, certain corps and division weather team members had to be parachute qualified--be able to jump with the airborne units they supported. As of December 1972, AWS had twenty-seven jump qualified people. Most were assigned in

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*Two of the first 18 active duty women selected for the Air Force's women's pilot training test program in 1976 were from AWS, as was one of the first six women in the Air Force's women's navigator test program.

Parachute qualified--are four men in top photo of Det 1, 16WS in 1962 from Fort Campbell where they supported the 101st Airborne Division: kneeling are A/2C Donald E. Hall and A/1C Dallas F. Davis; standing are 1/Lt Gordon Spillinger and TSgt Thomas F. Reed.

In the bottom photo, Sgt Wayne E. Fuiten has his straps checked prior to a jump. (USAF Photos.

support of the XVIII Airborne Corps, or the 82d and 101st Airborne Divisions, but others were assigned with the 7th Weather Squadron in Germany, and eight were assigned with the 5th Weather Wing's Detachment 75 at Eglin AFB's Hurlburt Field in support of Air Force and Army Special Forces.

In 1972 Congress insisted that the number receiving parachute jump pay in the military be reduced. [35] As a consequence, the Air Staff directed the major air commands to remove from jump status all those possessing "non-essential" Air Force Specialty Codes (AFSC). While the Air Staff overrode AWS' formal objections to losing some jump qualified slots, informally the AWS leadership was not at all upset with the loss. "If you look at it objectively, what kinds of weather [data] do you get out of those guys?" asked the AWS chief of staff, Colonel Edwin E. Carmell, hypothetically in December 1972 in referring to Detachment 75. "I think the answer is pretty clear," he continued: "they aren't needed."[36] Some three years later, in March 1976, Brigadier General Rowe, the AWS commander, fleered at the idea of his people being required to jump out of airplanes to support the Army.[37]

The general's attention was focused on the subject by MAC Inspector General admonishments over two AWS detachments not having enough parachute qualified people assigned to meet their wartime mobility missions. One was Detachment 75 and the other supported the XVIII Airborne Corps and the 82d Airborne Division at Fort Bragg.* "If we're going to be a member of the team," Rowe conceded, "then the [weather] people ought to be jump qualified."[38] The problem was that AWS could not find enough volunteers to fill the jump qualified slots. As a result, its units were habitually undermanned in jump-qualified people.

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*The problem was not new. During the Yom Kippur War of 1973, for example, when the 82d Airborne Division was placed on stepped-up alert for possible employment, AWS' Fort Bragg detachment did not have enough parachute-qualified people to meet requirements. Thus, an officer from a sister detachment supporting the Air Force at Shaw AFB, South Carolina, had to be reinstated to jump status and sent to Fort Bragg on temporary duty. See AWS Historical Study No. 6, *The Yom Kippur War, 1973: A Case History of AWS Contingency Support*, (S) Feb74, pp. 47-48. Info used (U).

CHAPTER 5 - EQUIPMENT AND MAINTENANCE

By the late Sixties and early Seventies, after years of frustrating and disappointing experiences, AWS officials came to refer to the Air Force' meteorological equipment research, development and acquisition process as the "Hallelujah Trail." History taught that, on the average, it took ten years from the time a requirement was originally expressed until the piece of gear finally found its way to the field--and of the wars the United States was involved in, only Vietnam lasted that long. Even then many projects fell by the wayside and expired, victims of delays inherent in the process, together with perpetual admonitions by the Air Staff to rejustify the original need. Some were overtaken by events; some collapsed under the weight of spiraling costs; and some were "pie-in-the-sky," beyond the state-of-the art, or were strangled by design alterations and modifications AWS insisted on while the embryo was yet in the womb. Of those that survived the acquisition process to emerge as prototypes, some could not withstand testing--e.g., the EROWS system discussed below. And finally, some that went into production, to AWS' chagrin, simply failed to fill the bill in the field--witness the AN/MMQ-2, the AN/TMQ-25, and the AN/TMQ-22 discussed below. Each administration in AWS knew that the "Hallelujah Trail" was simply unresponsive to AWS' needs; yet there was no alternative, and invariably one administration would optimistically begin the trek down it in quest of the golden chalice only to have to pass on the bittersweet pill of delay--perhaps denial--to an administration twice, sometimes three or four times, removed.

Particularly exasperating for AWS was its unenviable track record with tactical meteorological equipment acquired in the 1960s and 1970s. "In the equipment area, the objective is simple, rugged, and lightweight packages to support the field army," remarked the AWS commander, Brigadier General Best, while addressing the second Army weather support conference in January 1971; "experience in Southeast Asia was a good lesson in the results of over-sophistication."[1] He was referring to the Air Force's--AWS'--responsibility under the joint regulation to provide, install, and maintain fixed and tactical meteorological equipment needed by AWS units supporting the Army. Indeed, as discussed earlier, the tactical observing equipment AWS acquired for use in Vietnam was over sophisticated and too difficult to fix in the field.

AN/MMQ-2

The AN/MMQ-2 Manual Meteorological Station proved to be a classic white elephant, and support to the Army in Vietnam reportedly suffered because of it. Designed and procured based on lessons from AWS' experiences in the Korean War, the costly meteorological van--some $55,000 per copy[2]--was rushed by AWS into service in Vietnam in 1966 before provisions for spare parts were made, and before technical orders and specifications were available. Most of the fifty-eight vans produced were issued to the 5th Weather Squadron units supporting

In top photo, AN/MMQ-2 meteorological van being moved by an Army CH-54 "Flying Crane," from Tan Son Nhut, and in the lower photo, the van in place at Long Giao AI, RVN, 1968. (USAF Photos) the Army and, before long, they were pleading with AWS to remove them. A mobile tactical van in theory, the MMQ-2 proved to be immobile and "un"-tactical. The shelter suffered from corrosion; hydraulic seals ruptured; external power sources it needed to function were either unavailable or unstable; its weather sensors and ancillary equipment had high failure rates; and spare parts and maintenance people who knew how to keep it operating were both in short supply. "As a result," the 1st Weather Wing reported in 1970, "weather support to ground combat forces was degraded, the ability of . . . forecasters to assist close air support operations was significantly inhibited, and the effectiveness of the weather reporting network was seriously impaired."[3] With a deep sense of embarrassment, AWS decided in October 1969 to remove the MMQ-2s from the theater and replace them with World War II AN/PMQ-1 observing sets that were rugged, easy to deploy and install, and reliable. Although spare parts were hard to get, the PMQ-1's durability and simplicity made it more trustworthy than the sophisticated MMQ-2, and the accuracy of the data obtained with it was quite suitable for tactical operations.

The problems with the AN/MMQ-2 and over-sophisticated tactical meteorological gear in Southeast Asia was addressed rather colorfully by the AWS vice commander, Colonel Ralph G. Suggs, during an interview in July 1970. "We do not have tactical weather equipment that is worth a damn!" he had said. When asked to elaborate, he continued by saying, "We're trying to fight too sophisticated a war," and by so doing AWS was "not meet [-ing] the requirements of [the] SEA theater."[4]

The MMQ-2s were shipped from Vietnam to the Air Force Logistics Command's (AFLC) Sacramento Air Materiel Area (SMAMA) depot (the MMQ-2 item manager) in California for repair, initially, AWS believing that some of its field units' requirements would justify retaining about twenty vans. But after the experiences with the MMQ-2s in Vietnam, the weather wings and squadrons--and the Air National Guard weather flights--informed AWS that the vans were unsuitable for their tactical needs. Thus, after the tactical equipment (the AN/TMQ-14 ceilometer, the AN/TMQ-15 wind set, and the AN/TMQ-20 temperature-dewpoint set, were the major components) were removed, most of the vans themselves--the shelters--were returned by AWS to SMAMA and AFLC for disposition. By the close of 1978, only one shelter remained in use (as a temporary observing site with the 2d Weather Wing at Sembach Air Base, Germany), and, with the exception of the AN/TMQ-15, AWS had less than a dozen items of major tactical equipment from the MMQ-2s in service.[5]

AWS' experiences with the AN/TMQ-25 tactical ceilometer in Southeast Asia was a replay of the AN/MMQ-2's case. It was five years between the time AWS formally stated a need for the MMQ-2 and its initial appearance in Vietnam; it lacked four months of taking that long with the TMQ-25. Even then, if one considered AWS' past track record with acquiring new meteorological equipment, the normal "response" time had been cut in half.[6]

By late 1966, the 1st Weather Group faced the problem of providing observing support to tactical airlift elements periodically hauling troops and supplies into forward bases in Vietnam. The forward landing strips usually lacked standard flight service facilities and, since weather was often a menace, a weather observing service was needed. Therefore, small weather observing teams were deployed to furnish basic observations to airlift control teams guiding aircraft into and out of forward strips. Weather teams usually deployed with their AN/PMQ-4 portable observing kits, their M-16 rifles and sidearms, basic field equipment, and some C-rations. The first such weather team was deployed on 26 December 1966 aboard an AC-130 into Vi Thanh, Republic of Vietnam, in support of an operation that included the first large-scale paratroop drop conducted in that country in two years.[7]

Three months later, Seventh Air Force formally expressed (SEAOR--Southeast Asia Operational Requirement--95) an immediate need for a tactical cloud-height measuring device for use by AWS' weather teams at forward airstrips devoid of normal power sources. The SEAOR was drafted by AWS personnel. In February 1969, the Air Force awarded a contract to General Time Corporation, of Rolling Meadows, Illinois, for twenty-five AN/TMQ-25 tactical ceilometers--estimated costs having risen in 1968 from $127,500 to $290,000, or $11,600 per unit. Category I, II, and III testing of four sets was completed by December 1970, AWS declaring the AN/TMQ-25 "suitable for its intended function."[8] Although United States forces were withdrawing from Vietnam by then, the 1st Weather Wing expressed a need for the TMQ-25 in theater. AWS advised it to requisition six--the balance to be used by AWS units supporting the Army elsewhere. The first AN/TMQ-25s were installed with 5th Weather Squadron units in Vietnam in November 1971. They soon proved unsuitable for tactical operations. In March 1972, the 1st Weather Wing informed AWS that the TMQ-25s in Vietnam "have not made a single reliable ceiling measurement . . . [during] approximately 25 instances ceiling measurements were attempted with known ceilings of less than 3,000 feet." After discussing the set's deficiencies, the wing summarized it all by noting that "problems with the TMQ-25 do not focus on the maintenance, rather the problem seems to be a design deficiency of the equipment in its present environment."[9] The 5th Weather Squadron commander, Lieutenant Colonel Thomas A. Studer, labeled the TMQ-25's performance as "disappointing," adding that it was "too sophisticated for use at anything but established airfields and bare bases," which was unfortunate because "a better way to measure ceilings is greatly needed."[10] Studer's report was followed a month later--in June 1972--by one from the 1st Weather Group's operations officer who wrote that the TMQ-25 was "ineffective as a simple and reliable piece of tactical weather equipment," and that it reflected a "serious deficiency in the system for developing tactical weather equipment" because "field testing of a prototype model should have identified the deficiencies, prior to acceptance."[11]

Until 1977, when AWS decided it no longer could justify their retention, the AN/TMQ-25s were kept in service. During 1975, at AWS' request, the 2d and 5th Weather Wings reviewed their needs for the TMQ-25s. The 16th Weather Squadron informed the 5th Weather Wing that a cloud-height sensor was needed at corps, divisions, and brigades, "but the TMQ-25 does not meet the criteria for operating in a tactical environment."[12] Most of its units had turned their TMQ-25s in two years beforehand,[13] but the squadron notified the 5th Weather Wing that, if AWS insisted on keeping the TMQ-25s in service, it be limited to two per corps and one per division. Although its 5th Weather Squadron had difficulties with the TMQ-25 similar to those experienced by the 16th Weather Squadron, the 5th Weather Wing characterized them as merely "minor logistical difficulties" that could be overcome. The 5th Weather Wing had a need for a covert set to measure cloud ceilings, and the TMQ-25 was the only piece of tactical gear that afforded that capability. It alleged that the TMQ-25 functioned satisfactorily "within the specifications for which it was built," and that "in many instances, the problems seem to arise from lack of familiarization with the applicable T.O. [Technical Order]."[14] The 2d Weather Wing wanted no part of the TMQ-25. Among a host of shortcomings (i.e., too costly, too sophisticated, too bulky to parachute with or transport in available Army vehicles, etc.), its most serious drawback for them was that it would not work in cold weather. The 2d Weather Wing had no TMQ-25s, and did not want any--unless it could be modified to work in cold weather. The wing then could use fourteen, although not for brigade or drop zone support.[15] Therefore, in January 1977, AWS once again had to go to AFLC's Sacramento Air Logistics Center and ask that a piece of so-called "tactical" weather equipment--the AN/TMQ-25--be removed from its inventory because it had no valid use for it.[16]

AN/TMQ-22

Yet another piece of relatively new tactical gear with a turbulent history in AWS was the AN/TMQ-22 tactical meteorological measuring set.

A formal request for a battery-powered, tactical meteorological set for taking limited observations was originally expressed in SOR (Statement of Requirements) 175 of 13 January 1959,* and was subsequently resubstantiated by the Tactical Air Command's ROC (Required Operational Capability) 31-69 of 28 May 1969.

The need for such gear became particularly urgent in the mid-1960s as the Army deployed large numbers of troops to Vietnam. AWS had to survey its units worldwide to corral enough of the venerable AN/PMQ-1 and AN/PMQ-4 manual meteorological stations to meet the needs of war. Meanwhile, as an interim measure, it also obtained forty United States Forestry Service Fire Weather Observing Kits for use in Southeast Asia, at a cost of $119 apiece.[17]

A prototype, hand-held, tactical meteorological set with the nomenclature AN/TMQ-16 was developed and tested in the mid-1960s, but did not go into production because it could not meet the military

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*A blanket document for Project 433L, the "Weather Observing and Forecasting System," launched in August 1954.

specifications. Prototypes of the Army's AN/TMQ-22 and the Air Force's AN/TMQ-23, manufactured by the same company, were developed and tested in 1969. Neither set passed. After consulting with the Army, the Air Force--AWS--decided in 1969 to forego further development of the TMQ-23 and, once the Army corrected the deficiencies, purchase the TMQ-22s. They would replace the AN/PMQ-1s and AN/PMQ-4s, which were developed and purchased under a one-time contract, and for which spare parts had been depleted.[18]

The AN/TMQ-22s had been under development by the Army's Atmospheric Sciences Laboratory at Fort Monmouth. Agents from that facility, and from the Department of the Army staff, including Mrs. Frances Whedon, attended a technical exchange conference at the Air Force Academy in mid-July 1969. AWS representatives in attendance, led by the AWS vice commander, Colonel Suggs, were told by them that if AWS and the Air Force wanted to purchase the TMQ-22s in fiscal 1970, and could come up with the funds, the Army could contract for and deliver them by early 1971. Working feverishly through the Air Staff's assistant for weather (AF/PRW), AWS was able to see that the necessary funds were transferred from the Air Force Cambridge Research Laboratories (AFCRL) to the Army and, on 22 March 1970, it was announced at AWS that the Air Force would purchase 130 AN/TMQ-22s at a cost of $400,000. It was a joint buy with the Army, which had its own uses for the TMQ-22s it bought. The TMQ-22 was described by AWS as an "off-the-shelf" item, small, rugged, and battery powered, which could be carried into the field by one person. AWS expected the TMQ-22s to be in its inventory by May 1971.[19]

However, AWS learned in early September 1970 that, due to a "misunderstanding" between the Department of the Army staff and the Army's Atmospheric Sciences Laboratory, the TMQ-22 contract would not be let until January 1971, and that delivery of production models would take another fourteen to twenty-four months, depending upon the contractor's expertise. The Army expected to release formal request for proposals--bids--to the industry for the TMQ-22s in early October 1970.[20]

The news chafed the AWS commander, Brigadier General Best. "I cannot buy that," he stated emphatically. After recalling the Army's promises, he noted that AWS might have to buy the AN/TMQ-23 instead in order to get it in the field earlier. Whatever, he was intent on making an issue of the TMQ-22 with the Army. "We were lied to," he continued, and

> I think we've got to make an issue of it. If this [sort of] thing is allowed to continue . . . the Army can tie us up. . . . If the Army has something good, we'll buy it. We did this to get CRL [Air Force Cambridge Research Laboratories] off their ass. We are not chained to, or obligated to, CRL-researched products.

Best's assistant deputy for operations, Colonel Edwin E. Carmell, agreed that the slippage was unfortunate, but advised the general that, if AWS made an issue of it, "we could win the battle and lose the war as far as Army weather support. With egg on our face, we've got to go the TMQ-22 route." Another reason the colonel cited for sticking with the TMQ-22 was that it would cost about half what the TMQ-23 would. But Best would not be dissuaded. "If we don't make an issue of it the Army will think we're patsies," the general continued; "they hooked us for $400,000, then slipped the delivery eighteen months, and we don't even make a peep!" AWS had to take a stand, he said, fully aware that it would put "certain" Army people in a tight spot. In referring to the TMQ-22 problems, he and his staff again pointed the finger of suspicion at Mrs. Frances Whedon, Best labeling her a "chokepoint" in Army-AWS relations.[21]

Two weeks later, on 16 September 1970, in response to General Best's wishes to make an issue of the TMQ-22,[22] his staff assured him that a letter was being drafted for his signature registering AWS' displeasure with the delay. "I just can't believe we are going to have to accept an eighteen-month delay," the AWS commander said, and he directed his people to urge the Air Staff's assistant for weather (AF/PRW) to "rattle the trees" in the Army.[23] A week later, while attending another technical exchange conference, at Annapolis, Maryland, Best "rattled trees" himself, informing his staff upon his return that he had talked to an Atmospheric Sciences Laboratory official and "I gave him hell on the TMQ-22s." "What have we done on rattling the cage on the TMQ-22s?" he pressed his staff.[24]

Insofar as speeding up the acquisition of the AN/TMQ-22s was concerned, General Best realized that the matter was out of AWS' hands and that little could be done. He remained frustrated, however. Soon after the TMQ-22 contract was let in early 1971, he bet his chief of staff that the contractor would not have the production models ready by August 1972 as promised. He won the bet, but did not collect because both he and his chief of staff had long since retired from the Air Force when AWS received its first TMQ-22s--in the summer of 1975!

A formal request for proposals--bids--on the AN/TMQ-22 was released by the Army to industry on 15 September 1970, and on 8 February 1971 a contract was awarded to Air Flow Incorporated, of Glastonbury, Connecticut, to produce 130 of the sets for the Air Force.[25] Shortly afterward, because the money was no longer needed by the Army, the Air Force recouped $190,000 of the $400,000 it had transferred to the Army for the TMQ-22s.[26]

Initially, the first production model AN/TMQ-22s were scheduled for delivery in August 1972, but the date slipped to July 1973. The initial operational test and evaluation phase was completed in September 1972. But delivery of production models was slipped first to October 1973, and then to February 1974, due to the incorporation of engineering change proposals--design changes--asked for by AWS. An extra printed circuit board was incorporated, as well as the capability to use conventional 110-volt alternating current circuits as an external power source. An AWS request in 1973 to purchase sixty-five additional TMQ-22s was rejected by the Air Staff. The first production article TMQ-22 was accepted by the Army on 3 April 1974, and the production sets were shipped by the contractor at the rate of about fifteen per week soon thereafter. The first six production set TMQ-22s arrived at AFLC's Sacramento Air Logistics Center--the Air Force item manager for the TMQ-22--on 11 November 1974. However, in agreement with AWS' wishes, the Sacramento Air Logistics Center would not distribute the TMQ-22s to AWS field units until up-to-date technical orders could accompany them. The date of publication of the AN/TMQ-22 technical order was 1 May 1975, and in July 1975 the Sacramento Air Logistics Center began shipping the TMQ-22s and technical orders to AWS units. Approximately half of the 130 TMQ-22s had been shipped by September 1975; all were in the field by year's end.[27] Estimates of the cost to the Air Force for each of the original 130 AN/TMQ-22s ranged from $1,300 to $3,500.[28]*

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*One AWS authority, Mr. Max M. James--Ground Systems Engineering Div (AWS/LGLG), Dir of Meteorological Systems Engineering, DCS Logistics, HQ AWS--was of the opinion that the AN/TMQ-22s cost close to

The fact that it took over sixteen years from the time the requirement was originally expressed until the first AN/TMQ-22s became available to its field units was a bitter experience for AWS to digest; but the situation became intolerable when reports began filtering through from the field units in the late summer of 1975 that the TMQ-22s would not work! Among other problems it would not work in the frozen climes of places like Alaska or Germany; the case it was carried in was not waterproof; its zinc-carbon batteries had short lives; the barometer did not maintain calibration well; its wind sensor was defective; it gave incorrect temperature and dew-point readings; and it was difficult to obtain spare parts due to the difference in the Army and Air Force supply systems. In regard to the latter shortcoming, the 5th Weather Wing felt that "we are not getting the necessary support for the TMQ-22s from higher headquarters"--AWS.[29]

The instructions to the field from AWS headquarters in 1976 were terse: make the AN/TMQ-22 work because it was the only new piece of tactical equipment AWS would get. "What you've got is what you'll get, fellows," Brigadier General Rowe, the AWS commander, laconically told his wing commanders in early November 1976; "we may have to go to war with it."[30] Rowe had been the TMQ-22 program monitor on the Air Staff (AF/PRW) during the original purchase. In fact, AWS was considering purchasing up to seventy-five more TMQ-22s (by late 1976 the Sacramento Air Logistics Center had made a "follow-on" buy of twenty-eight TMQ-22s) but, based on poor field performance, decided to rewrite the technical orders and modify the sets it had. A meeting was held at Fort Monmouth in mid-November 1976 with Army representatives who agreed to incorporate the modifications AWS wanted before buying more TMQ-22s--but there was no "get well" date. In the meantime, AWS repeatedly sent instructions to the field on how to overcome the TMQ-22's problems, including a training plan in early 1976 and a special brochure a year later on how to operate, maintain, and obtain spare parts for the sets. In summarizing the situation in early 1977, the logistics staff agency at AWS headquarters reported that the TMQ-22[31]

> has been praised, maligned, misused, and abused. Almost all parts are physically available to support the set. Those who have had trouble are the ones who ignored the training plan, knew little about operation or maintenance, and were unable to order parts because of unfamiliarity with procedures. . . . However, . . . the TMQ-22 seems to be on its way to becoming an operational inventory item.

The report may have been prematurely optimistic. During a look at the 7th Weather Squadron in May 1977, the MAC Inspector General found that the squadron lacked enough operable AN/TMQ-22s to support USAREUR in war. The reliable, battle-tested, and cheaper belt weather kit was recommended as an authorized replacement

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*(Cont) $3,077 each--or $400,000 for 130 sets. He noted that, while the Air Force may have recouped $190,000 of the $400,000 it had transferred to the Army in 1970, it spent nearly that much to acquire such supplementary items for the TMQ-22s as spare maintenance parts--as opposed to spare parts kits that were part of the basic TMQ-22 contract--and technical publications, etc. (Telephone conversation by author with James on 5Oct78.)

A document AWS published in 1978 (AWS Pamphlet 105-53 *Weather: Air Weather Service Meteorological Sensors and Related Equipment*, 30Sep78, p. 1-60) put the cost of a single TMQ-22 at $3,500.

for the unreliable and costly TMQ-22. The Inspector General further recommended that AWS review its need for the TMQ-22 and, if cheaper but sufficient tactical meteorological equipment was available, halt further purchases of the TMQ-22.[32] AWS directed Detachment 75 of the 5th Weather Wing's 3d Weather Squadron at Eglin AFB's Hurlburt Field to compare the quality of data obtained from the TMQ-22, the AN/PMQ-1, and the belt weather kit. The results demonstrated that data obtained with the belt weather kit was "relatively accurate" and its reliability was as good or better than the PMQ-1 or TMQ-22.[33] It was therefore recommended within AWS headquarters that the TMQ-22 *not* be modified. And to further muddy the water for the field units, AWS published a directive on tactical weather support on 31 August 1977 which designated the TMQ-22 as the "primary piece of tactical observing equipment"--although the PMQ-1, AN/PMQ-4, and the belt weather kit were authorized as back ups.[34]

In November 1977, the Sacramento Air Logistics Center issued a purchase request to the Army to procure thirty-one additional AN/TMQ-22s to fill back orders and the unfulfilled authorizations of AWS units. AWS asked that the modifications it proposed a year earlier be incorporated into the additional sets, as well as those already in the inventory. The Army agreed to AWS' proposal. Among other changes, the new sets would have improved barometers, better battery case accessibility, more power, longer cables, and be waterproof. By the close of 1978 the Army still had not issued a call for competitive bids for the thirty-one TMQ-22s, or the modification kits, and forecasts were that AWS would not receive them for another two and one-half years.[35] In the meantime, AWS continued to urge its field units to replace the troublesome zinc-carbon flashlight batteries in the sets on hand with alkaline-manganese batteries that performed better in low temperatures.[36]

Belt Weather Kit

In the meantime also, based on the Hurlburt Field tests in 1977, AWS decided to procure 189 of the belt weather kits, a figure changed later to 250. Consisting of a wind meter, compass, rain gauge, sling psychrometer, and miniature psychrometric and pressure reduction calculators, all in a heavy-duty case, the belt weather kit, patterned after a "fire weather kit" tested in Vietnam in the 1960s, was to be used as a back-up to the AN/TMQ-22s.

A contract for 250 belt weather kits was awarded in September 1978 to the Western Fire Equipment Company, Brisbane, California.[37] The company delivered the prototype to AWS for evaluation on 2 January 1979,[38] and the balance of the order on 27 April 1979. AWS then shipped the kits to field units on 1 May 1979, with instructions to requisition from their host supply offices an altimeter barometer to go with them, manufactured by the Taylor Instrument Company of Asheville, North Carolina.[39] The kits cost $126.05 each, while the altimeter barometers cost $94 apiece.

AN/TPS-41

In early 1969, the Army formally stated a requirement for a mobile or tactical weather radar. In conjunction with Fairchild Hiller (later Fairchild Industries), it developed a prototype, X-band

(3.2 centimeter wavelength), mobile weather radar with a 240 kilometer range, designated the AN/TPS-41. Engineering tests of the prototype were completed by the Army at Fort Huachuca in July 1970, after which it was moved to Fort Sill where a joint service test with the Air Force was completed in April 1971. Then a review of the program, scheduled by the Army's Atmospheric Sciences Laboratory for November 1971, was slipped indefinitely pending a re-evaluation by the Army of its need for a tactical weather radar. The Army was not overly enthusiastic about underwriting the entire cost of putting the TPS-41 into production.[40]

It was aware, however, that the Air Force might help defray the cost of producing the AN/TPS-41. On 21 April 1969, the Tactical Air Command (TAC) formally established a requirement for a tactical weather radar to complement the Tactical Weather System, which was designed to support tactical air forces during operations from so-called "bare bases."[41] In an effort to keep costs reasonable, it was decided to take advantage of the spadework the Army had done with the TPS-41. At an Army weather support conference in April 1970 it was informally agreed that the Army would procure and maintain TPS-41s for corps and division support, while Air Force (AWS) personnel would operate them; for "bare base" support, the Air Force would pro-procure, operate, and maintain the TPS-41s.[42] Once the joint service test of the TPS-41 prototype was successfully completed, it was felt that a contract could be let by February 1973, and that the first production model could be in operation by June 1975.

However, before proceeding with a contract, the Air Staff wanted to review the need for an X-band tactical weather radar as opposed to C-band (5.4 centimeter wavelength) radars. For AWS, the wavelength question was a key issue. Even though it would be larger and cost more, a C-band radar was favored by AWS because X-band radars had greater attenuation difficulties. The Army insisted on the less-sophisticated X-band radars for support of its units. In the fall of 1971, at AWS' instigation, Fairchild furnished estimates to, one, convert the Army's prototype TPS-41 to C-band configuration and, two, produce and test an entirely new C-band prototype. Both estimates were considered excessive.[43] Still, on 24 September 1971, AWS recommended to the 5th Weather Wing, whose primary mission was support of TAC, that the TPS-41 wavelength be changed from 3.2 to 5.4 centimeters. With its TAC "hat" on, the wing accepted AWS' position in principle, subject to numerous reservations.[44]

At a January 1972 meeting with Army officials it was revealed that the Air Force might underwrite procurement of six AN/TPS-41s with fiscal 1973 or 1974 funds for the Tactical Weather System. Since the TPS-41s would not be available in time for installation in Tactical Weather System shelters, the Air Force concept was to procure the TPS-41s in separate shelters so that they could be deployed independently of the parent system. But AWS voiced strong objection to an X-band TPS-41 at the meeting, noting that if the Army decided not to purchase X-band TPS-41s, it would do all it could to get funds to convert the TPS-41s to C-band models.[45]

During 1972, upon the 5th Weather Wing's advice, TAC's position supported a buy of six AN/TPS-41s in their own shelters--unless an alternative radar could be found with similar capabilities, cost, and weight.[46] It was generally believed that a determination of who would buy, operate, and maintain the AN/TPS-41s would have to be made at the Air Staff and Department of the Army level. Accordingly, the Air Staff addressed a letter to the Army in the late summer of 1972 soliciting a position on the joint procurement and funding of the TPS-41.[47]

After the Department of the Army demurred on contributing to the purchase, the Air Staff published a program management directive in early 1973 authorizing the Air Force Systems Command (AFSC) to procure through Army channels six X-band AN/TPS-41s it referred to as tactical weather radars.[48] For the purpose, it set aside $2.716 million in fiscal 1974 funds--about twice the original estimate. Adding to the cost was the refusal by AFSC and the Air Force Logistics Command to accept specifications for the TPS-41 developed by the Army.[49] Consequently, the Air Force would have to purchase new specifications.

Representatives from AFSC's Electronic Systems Division (ESD), which was to shepherd the radar acquisition, worked with the Army in late 1973 resolving differences in the specifications, deciding on a method of procurement, and drafting a formal memorandum of agreement.[50] ESD published a program management plan for the six AN/TPS-41s on 6 September 1973.[51] A memorandum of agreement between the Army and ESD for the purchase of six sets to support Air Force operations was completed in December 1973. Once signed, an interdepartmental purchase request was released to the Army in January 1974 for sole-source procurement from Fairchild.[52] It was planned to use shelters for the TPS-41s furnished from Army supply stocks at a cost of $3,000 each. The contract with Fairchild was expected to be consummated by July 1974, with delivery of the first TPS-41 anticipated a year later.

Meanwhile, the Army's prototype AN/TPS-41 was on display at Fort Rucker, Alabama, "in a final effort to solicit U.S. Army aviation support for some U.S. Army sets," read a TAC report; "if successful, the U.S. Army may append an option buy to the [Fairchild] contract."[53]

Fairchild's bid for the six AN/TPS-41s was received and reviewed by ESD in mid-May 1974. It was adjudged to be too high, and ESD informed the Army that procurement through Fairchild would not be pursued further.[54] "The TPS-41 has come under fire at the Pentagon [Air Staff] due to soaring costs (nearly $1 million each)," an AWS report read.[55] The Air Staff revised the program management directive to permit ESD to look at other radars that would fulfill the needs of the tactical air forces. With that decision, pursuit of a tactical weather radar reverted to "square one," essentially, after five years of effort.

AN/TPS-68

As a ready alternative to the AN/TPS-41, ESD turned immediately to the Navy's Naval Avionics Facility Indianapolis (Indiana--NAFI), which designed and built the FPS-106 radar. NAFI estimated it could begin work on an engineering model of the tactical weather radar by late 1974, and have all six sets in the field by March 1977. A new program management plan was published by ESD on 30 August 1974. NAFI's formal proposal was delivered to ESD on 3 October, and on 4 November 1974 a formal memorandum of agreement for the production of six tactical weather radars was consummated by the two parties.[56] The Air Force transferred $1.3 million to the Navy for the design and test of the engineering or integration model.

Thus, development began on another tactical weather radar, expected to be less expensive than the AN/TPS-41. NAFI's version was to be a C-band (5.4 centimeter wavelength) model, weighing 5,000 pounds, with a 200 nautical mile range.

In the interim, on 2 August 1974, the 5th Weather Wing published a concept of operations for the tactical weather radar. It was acknowledged that commercial radars were available "off the shelf," but that they were not configured for tactical use and were not rugged enough. Selection of a wavelength was "extremely sensitive," and AWS preferred C-band models. The tactical weather radar's primary mission was to be used in support of tactical air forces at "bare bases" in conjunction with the Tactical Weather System; its secondary mission was in support of the Army in the forward battle area.[57]

In what became a precursor of events to follow, progress at NAFI on the tactical weather radar lagged in 1975 as unanticipated problems cropped up. The critical design review was deferred from November 1975 to April 1976, and the scheduled delivery of the first set slipped to July 1977. The main reasons for the slippage were that a vendor was late in shipping some electrical components, difficulties with receiver design and integration, and delays in programming software for the built-in test equipment.[58] ESD published a revised program management plan on 1 September 1975.

Fabrication of the tactical weather radar began in May 1976.[59] Delivery of the six sets was postponed to December 1977. A maintenance concept was developed, and TAC agreed that AWS should use the radars as contingency assets and, or gap-fillers.

In early 1977 the tactical weather radar was assigned the official nomenclature of AN/TPS-68. The program overran its budget by $663,000 and there was talk in March 1977 of reducing the final buy to five sets to keep the costs acceptable. But by mid-April ESD had been allocated additional funds to continue procuring six sets. The shelter contract was awarded in May 1977--two months after the date NAFI had originally forecast it could have all six sets in the field.

Fabrication of the first AN/TPS-68--the pilot or prototype model--was completed in September 1977. As 1977 closed, disputes with the contractor deferred the scheduled delivery of the shelters to May 1978, which, in turn, slipped the total TPS-68 program by at least another six months. Total program costs for the six sets was rapidly approaching $4,000,000.[60]

Preliminary testing of the prototype AN/TPS-68 by the Naval Avionics Center (NAC, formerly NAFI) in 1977 and 1978 uncovered numerous problems with such things as the wiring, circuits, antenna alignment, and power output. A problem with spare parts cropped up because the Defense Electronics Supply Center (DESC), which procured all standard electronic items for the Defense Department, would not order spares before the radars were turned over to the Air Force, and NAC would not manufacture the spares without a funded purchase order from DESC. A compromise was reached whereby DESC agreed to go ahead and procure spares, recognizing that the TPS-68 was not a standard inventory item, but was a one-of-a-kind breed.[61]

Of all the headaches that strung out the delays, the biggest involved the shelters for the AN/TPS-68. The original bids for the shelter contract were considered too high, so NAFI (or NAC) issued a second call for proposals. It then awarded a $125,000 contract to the Nordam Corporation of Tulsa, Oklahoma, to produce six shelters. A dealer in fiberglass products, it was the firm's first defense contract, and its bid was lower than the nearest competitor by more than half. Nordam prolonged delivery. When the first shelter was finally subjected to transportability testing in 1978 it suffered structural failure, and was essentially destroyed. Nordam then notified NAC that no more shelters would be delivered until at least January 1979. Without the shelters the TPS-68s could not be used. So they became the pacing factor rather than the basic sets, which had also been delayed. The Navy initiated default proceedings against Nordam, but after months of deliberation, decided such recourse was fruitless because of the contract's vague wording. It appeared that there was no feasible alternative to waiting for Nordam to deliver. On top of that, it was evident that Nordam would demand, and be granted, at least another $100,000 to build six shelters capable of passing acceptance testing.[62]

Thus, after ten years, the Air Force still did not have the tactical weather radar it sought in 1969. And the cost of the one it had contracted for was about twenty-five times the cost of the only other "tactical" weather radar in the AWS inventory in 1978--the AN/FPS-103 (WTR-1), an X-band model rushed into service in Vietnam by AWS in mid-1968, but most of those in service with AWS in 1978 were used in a fixed or permanent mode.[63]

A desire not to expose any of the half-dozen costly AN/TPS-68s to threat by an enemy was one reason AWS offered officially for not actively seeking the tactical weather radar for support of the Army in the field. In a position paper it published in June 1978, AWS declared that all six radars would be used for "bare base" support of tactical air forces. AWS did not question the use of weather radar to support the Army in garrison, but in the field it not only would be vulnerable, but difficult to move about and keep in service. As an acceptable and viable alternative to the tactical weather radar, AWS suggested reliance on weather satellite data by locating direct tactical satellite readout facilities at "command and control centers"[64]--an evident euphanism for theater level headquarters such as USEUCOM, the United States European Command. Because, as the discussion that follows points out, the AWS and Air Force position was that if the Army wanted a direct tactical satellite readout facility at any echelon below the theater level--at the field army or corps, for example--it would have to buy it; AWS preferred indirect support--i.e., disseminating weather satellite pictures to the corps level by facsimile.

Tactical Satellite Readout

Unquestionably, the greatest technological advance brought to bear by military meteorologists during Vietnam was the weather satellite. Data was available to AWS readout facilities in theater from two sources: civil satellites, the first of which, TIROS (Television and Infrared Observation Satellite) I, was launched in 1960;[65] and Air Force weather satellites (referred to in 1978 as DMSP--Defense Meteorological Satellite Program), first launched in the mid-1960s.[66] Positioned in sun-synchronous, near polar orbits, DMSP satellites offered pictures with nearly twice the clarity than available from civil satellites because, at their 450-mile altitudes, they were about half as far from the earth as their civilian cousins. But DMSP satellites also had better sensors, an infrared capability, superior processing equipment, more favorable orbital characteristics, and more accurate data location (gridding). In short, DMSP was designed to support military requirements. But pictures from either satellite, civilian or military, gave decision makers a look at the prevailing weather over hostile areas--areas from which conventional sources of weather data were shut off.

In conducting the air war in Southeast Asia, weather satellite products were relied on heavily, in particular for strikes against targets in North Vietnam. General Momyer, the Seventh Air Force commander from mid-1966 to mid-1968, described the weather satellite as "the greatest innovation of the war."[67] In the early 1970s, Air Force officials were publicly describing the DMSP satellites as the Defense Department's "most important single source of weather data," averring that they furnished "the best data possible to decision makers anywhere in the world whose operations are affected by weather."[68] Indeed, the Navy installed DMSP readout gear aboard the aircraft carrier *Constellation* in the early 1970s and, following tests during a combat patrol in the Gulf of Tonkin, concluded that it proved "conclusively its value to carrier tactical *air* [author's italics] operations."[69*] But only rarely during that war did Army decision makers at any level--from the field army (Headquarters USARV) through corps (I and II Field Forces) to division and below--benefit from the direct weather satellite support routinely made available by AWS to key Air Force decision makers in theater.

In general, AWS furnished indirect weather satellite support to the Army in Vietnam, and direct support to the Air Force. AWS operated a DMSP readout site in theater, as well as equipment at three different locales for receiving data from civil satellites[†]--all located with (or adjacent to), and directly serving, Seventh Air Force command and control facilities. Key Seventh Air Force decision makers had continuous direct access to pictures and data from both satellite sources, while their Army counterparts rarely saw them.

Army decision makers benefited from weather satellite data only in that it was one of several sources used by AWS' theater weather center at Tan Son Nhut Air Base to issue area forecasts and forecaster aids.[**] In turn, the center's area forecasts--when available, and once altered and refined--became the basis for terminal or tactical or mission control forecasts issued by AWS forecasters at corps and divisions. In March 1970, the center began transmitting satellite pictures from civil satellites over facsimile circuits,[††] but it was

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[*]The DMSP receiver gear aboard the *Constellation* occupied one aircraft parking space, but the ship's skipper said "the trade-off has been more than justified." There were also a couple of occasions when the DMSP antenna system just below the flight deck inadvertently served as a handy arresting barrier for fighters that went out of control upon landing. See p. 4 of script of briefing on DMSP presented by Brig Gen Best, AWS comdr, to MAC commanders' conference at Ramey AFB, PR, on 23Mar72, on file in AWS historical archives. See also Vol I, "Narrative," pp. 738-39, of "History of Air Weather Service," (S), 1Jul71-30Jun72. Info used (U).

[†]At the time, DMSP readout sites were not rigged to acquire data from civil satellites, and the readout equipment for tapping the civil satellites could not get data from the DMSP satellites.

[**]The center's area forecast bulletins contained a section that discussed the satellite-derived data used in preparing the prognosis. And, beginning in 1968, the center also issued a special bulletin once a day containing a graphical representation of the satellite data, including the amount and type of cloud cover. Those products were available to AWS forecasters with units supporting the Army, and were used by them to produce tactical forecasts.

[††]For security reasons, the center could not transmit DMSP products--or at least identify them as such--over the unsecure facsimile circuits.

weeks later before the facsimile equipment was finally installed and working at 5th Weather Squadron units supporting Army elements. Not only were the facsimile pictures of poor quality, but by then, the Army was going home, and within a year the facsimile equipment was being removed.

There were exceptions to this general application of weather satellite support to the Army.* Pictures and data were used in briefing the USMACV commander (an Army general, heading a unified command) and his staff--usually at the regular Saturday morning situation conference, where a seven-day forecast was presented, but also when the tempo in fighting demanded closer attention to the weather. During the 1968 Tet offensive, for instance, AWS personnel briefed the USMACV commander daily, weather satellite pictures and data forming part of the presentations.

It was in 1968 that the 5th Weather Squadron commander, Colonel Cummins, used initiative to get DMSP satellite pictures for presentation to USARV officials at Long Binh. Because of the program's tight security, no one in his squadron--which supported the Army--was granted access to DMSP's details. Few of his men were aware of the DMSP pictures; but he was, and he arranged for them to be flown daily from Tan Son Nhut to Long Binh by Army helicopter. He asked no questions about their source, but he had pictures from the "morning" DMSP satellite pass up to Long Binh by noon to show USARV officials. They were shared with his forecasters supporting Headquarters II Field Force at Long Binh, and "every now and then" (about once a month),[70] when combat operations warranted it, Cummins arranged for an Army helicopter to take them to his people supporting Headquarters I Field Force at Nha Trang.†

While Colonel Cummins got the DMSP satellite pictures, which were quite valuable, his forecasters could have used DMSP data as well, in particular to support Army planning for extended combat operations. The staff weather officer to the I Field Force in 1966 agreed that he could have put the weather satellite pictures and data--from either the civil or DMSP versions--to good use, but it was not made available

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*In 1966, for instance, AWS' weather center at Tan Son Nhut issued special operational forecasts in direct support of 9th Infantry Division operations in the Mekong Delta--where, incidentally, weather was not the factor it was elsewhere in the country. And during the Tet offensive of 1968, the center issued five-day forecasts twice daily for selected areas near the demilitarized zone, and terminal forecasts for four sites of particular interest to the Army, including Khe Sanh and the A Shau Valley. Those forecasts were based, in part, on data acquired from weather satellites.

†Ironically, unbeknownst to Col Cummins or his people with I Field Force at Nha Trang, AWS personnel were couriers of DMSP pictures daily by aircraft from Tan Son Nhut to a 1st Weather Group operating location at Nha Trang supporting USMACV's covert SOG (Studies and Observation Group) operations. Extremely sensitive and highly secret at the time, SOG was a cover title for Army--as well as Navy, Air Force, and Vietnamese--Special Forces elements that ranged through Laos, Cambodia, and North Vietnam on clandestine guerrilla forays. See: Gen William C. Westmoreland, *A Soldier Reports* (Garden City, NY: Doubleday & Co., Inc., 1976), pp. 127-30; and Col Francis J. Kelly, *U.S. Army Special Forces, 1961-1971*, from *Vietnam Studies* (Wash DC: U.S. Govt Printing Office, 1973).

to him.[71] Major General Tolson said he could have used them during the 1968 Tet offensive.[72]

AWS had reasons for not making weather satellite data routinely available to the Army in Vietnam. First of all, throughout the war, the DMSP program was operated under such tight security wraps that only a few within AWS were aware of its existence--at least officially.[73] Fewer still in the Air Force and Army at large knew of it. In a word, it was inaccessible to all but a handful, and AWS, together with the DMSP program managers, determined who got access. Therefore, security precautions imposed by Air Force and Defense Department officials responsible for DMSP limited its utilization tactically. It was significant that, during final preparation for one of the Vietnam war's most spectacular operations, the daring (though unsuccessful) attempt by Army (mostly Special Forces) and Air Force volunteers in November 1970 to rescue American prisoners of war confined at Son Tay, access to DMSP products was initially denied by the 1st Weather Group commander, ostensibly for security reasons.[74]

Additionally, DMSP was a unique program (the only one of its kind in the Defense Department), paid for and delicately shepherded by the Air Force (within Defense Department guidelines) to meet the requirements of a high-priority Defense Department "special strategic" mission, and in its neophyte stages in the mid-1960s. With but one exception, strategic rather than tactical requirements--even in war--governed DMSP's orbital characteristics: in 1965 a DMSP satellite was orbited to meet Seventh Air Force's tactical requirements.[75]

Realistically, weather service was not much of a factor in close air support of Army operations in Vietnam. It was generally sought by Army decision makers before launching extended operations; but once launched, all supporting air strikes were handled by Air Force FACs--Forward Air Controllers. If the FAC could identify and mark a target it was struck; if it was obscured by weather, then he did not clear the air strike. Weathermen were more dependent on FACs for weather information than vice versa. If an Army unit in contact with the enemy called for airlift support--either Air Force fixed wing aircraft or Army helicopters--the pilots and crews responded regardless of the weather, particularly when resupply or extraction became a life-and-death matter for soldiers on the ground. Thus, there was a belief by AWS officials, reinforced by knowledge that Army commanders were generally unaware of the nature or extent of service available through AWS or how to use it, that weather satellite pictures were not routinely of value to Army operations. Seemingly, more uses for direct weather satellite service arose in conducting air operations than ground operations. AWS' position was that the indirect weather satellite service sufficiently met the Army's needs in Vietnam.

Yet studies by the Army in the 1960s and 1970s (discussed in detail below), addressing weather and weather service, concluded that it had been remiss in not exploiting operationally the technological advances in the field of meteorology, including computers, radar, and the satellite. Army decision makers in the field needed direct weather satellite support. As a consequence, Army overtures surfaced for introducing a tactical satellite readout capability at the corps level, at a minimum, and in some instances at division and brigade.

The Seventh Army in Germany and USAREUR (United States Army Europe) became bellwethers. In July 1972, USAREUR composed a ROC (Required Operational Capability) for a direct satellite readout capability. At the time, the only DMSP readout site in Europe was operated by AWS at Ramstein Air Base, Germany--until October 1973 when it was moved eight miles south to Bann to provide improved coverage of the Middle East. USAREUR officials did not have direct access to DMSP products until 1973 when the program's rigid security restrictions were eased. They then had two means by which they could get DMSP data and pictures from AWS' readout site: by Army couriers hand-carrying the pictures daily, and through transmission over facsimile circuits. Couriers were a costly, cumbersome, and untimely means, and satellite pictures transmitted over facsimile circuits lost their clarity, and therefore their value. In fact, DMSP pictures received over facsimile circuits were of lower quality than pictures from civil satellites provided USAREUR officials--which were acquired with an AN/TKR-1 APT (Automatic Picture Transmission) mobile readout operated by the 2d Weather Wing's 7th Weather Squadron. But the AN/TKR-1 receiver was never modified to acquire data from the second generation, polar-orbiting Improved TIROS Operational Satellite (ITOS), launched in 1970, despite notices by the National Weather Service to APT users of the need to do so. Thus, real-time weather satellite imagery support to the Army in Europe ceased entirely in the early 1970s. So once USAREUR and Seventh Army officials were apprised of DMSP's capabilities, they recognized a need for direct access to them.

Brigadier General Aldrich, the AWS commander, was in Europe and had spoken with USAREUR and Seventh Army officials when the Yom Kippur War of October 1973 broke out. When he returned he asked his staff what had been done to get DMSP to the corps level, adding that he believed the Army should pay for it.[76] After some deliberation, it was decided to have the Army specify its needs in another ROC. Thus, on 17 July 1975, with the help of the 7th Weather Squadron, USAREUR and Seventh Army submitted for consideration by the Department of the Army a proposed ROC calling for a tactical direct satellite readout.

A month later, TRADOC asked USAICS (United States Army Intelligence Center and School) at Fort Huachuca to ascertain whether the requirement was valid. In mid-October 1975, USAICS advised that the need was well grounded, but suggested that a cost analysis be conducted to determine how best to meet it.[77] A direct readout capability was needed, but the readout vans AWS then used were too large and bulky. A smaller, portable van was preferable. By August 1977, to meet the USAREUR requirement, TRADOC had identified the Mark IV tactical transportable DMSP vans which the Air Force was then procuring at a cost of about $1 million each.[78]

By 1977, the responsibilities concerning the management and operation of DMSP were set forth in a formal memorandum of agreement consummated the previous November by the Army, Navy, and Air Force. In it were provisions for the Army to purchase, operate, and maintain its own tactical DMSP readout facilities, and for the Air Force, as the executive manager of DMSP, to provide contract management when asked for by the Army.[79] TRADOC wanted to modify the agreement to get the Air Force to operate and maintain any DMSP readout the Army procured and, until September 1977, assumed that the contract the Air Force was negotiating to buy four Mark IV readout terminals would include an option to buy additional units for the Army. But TRADOC's assumption was false: there would be no option for follow-on buys in the initial contract. If the Army wanted the Mark IV, under the agreement's provisions it would have to submit a formal requirement and negotiate a second contract.[80]

At the right, Lt Col Walter M. Dale, staff weather officer to VII Corps and commander of the 7WS's OL-B, looks at weather satellite picture transmitted via facsimile.

Below, upon his promotion to colonel a few weeks later, in December 1974, Dale is congratulated by Lt Gen George S. Blanchard, commanding general, VII Corps. (U.S. Army Photos)

TRADOC then directed its CACDA (Combined Arms Combat Development Activity) at Fort Leavenworth to review the need for, and potential location of, a direct tactical satellite readout at the corps level. CACDA's position as 1977 closed, was that there be one, Air Force (AWS) operated, direct tactical satellite readout in the

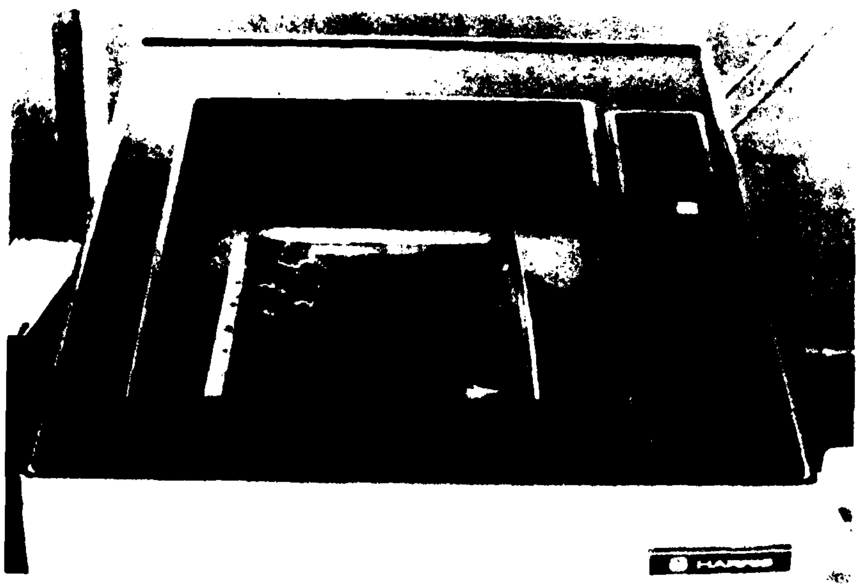
European theater, with a remote copier provided by the Air Force to CENTAG (NATO's Central European Army Group), with possible retransmission or relay to corps. As a second choice, CACDA opted for the Air Force to provide a direct readout at the army group with remote copiers at the corps. Only if both options were infeasible or impractical would CACDA consider a direct readout at the corps. Of primary consideration in CACDA's position was a desire to keep the number of people in corps operations centers or command posts as small as possible, and avoiding transportation or mobility problems associated with a satellite readout van.[81] Therefore, CACDA's and TRADOC's position was in gee with AWS': only one DMSP readout site was needed in Europe, and it need not be located with USAREUR or the Seventh Army.

From at least 1973, the mechanism AWS envisioned for getting DMSP pictures from a single readout site in theater--be it Europe or a place like Korea--to decision makers at USAREUR and the corps level was the Satellite Imagery Dissemination System, SIDS. The problem with the high resolution DMSP imagery was disseminating it to decision makers, and by using "off-the-shelf" facsimile equipment, SIDS would permit the transmission of DMSP positive transparency data, with at least one nautical mile resolution, over existing facsimile circuits. Through SIDS, AWS could rapidly get DMSP data to a minimum of some three dozen "customers," including the respective headquarters of USEUCOM (United States European Command) at Vaihingen, USAREUR at Heidelberg, V Corps at Frankfurt, VII Corps at Stuttgart (all in Germany), and the Eighth Army at Yong San Reservation Army Installation, Korea.[82] A formal ROC for SIDS, specifying it be in the field ready for use by 1980, was forwarded by AWS in September 1976 for consideration by MAC. Estimates in 1977 for the overall cost of SIDS ran to $5,200,000. MAC was coordinating the ROC with other major air commands when, in September 1977, the Air Force scuttled the ROC process in favor of a GOR (General Operational Requirement) system. Thus, AWS had to rewrite some of the justification for SIDS. MAC then approved the GOR and, after securing the support of six other major air commands, forwarded it for Air Staff consideration in June 1978.[83] As 1978 closed, the Air Staff had taken no concrete action on it.

In the meantime, AWS was granted approval to proceed with a so-called "mini"-SIDS for Europe and Korea. The need was immediate; the equipment available.

A "mini"-SIDS in Korea became operational in October 1977. A leased Muirhead M-133A transmitter at the DMSP readout at Osan Air Base transmitted satellite imagery via facsimile to Muirhead K-300 recorders installed at Yong San (Headquarters United Nations Command-United States Forces Korea-Eighth Army) and Kunsan Air Base in Korea, and Yokota Air Base in Japan. The Muirhead recorders provided acceptable products, but they and the transmitter were extremely difficult to maintain. Consequently, the Muirhead system was replaced with Harris Corporation equipment that had been installed in Europe and worked so well. Installation of the Harris gear was completed in late 1978, at a cost of approximately $60,000 (excluding a recurring annual cost of about $9,000), and the quality of DMSP pictures received at Yong San was reportedly outstanding.[84]

The "mini"-SIDS in Europe became operational in November 1977. It consisted of a Harris Corporation Model 800 transmitter at the DMSP readout at Bann, and Harris Corporation Model 800 laser facsimile receivers at Ramstein Air Base (2d Weather Wing's weather support unit at Headquarters USAFE--United States Air Forces in Europe), Patch Barracks at Vaihingen (Headquarters USEUCOM), and at the NATO bunker



At the top, Capt Frank Luna (left) and Maj Glenn W. McBride are removing DMSP imagery from Harris laser facsimile receiver during exercise Brave Shield XIII in Florida in 1975. Bottom photo is a closeup of the receiver. (USAF Photos) at Boerfink. DMSP imagery received via the "mini"-SIDS at those terminals in Germany was also reported to be excellent.[85]

By the close of 1978, therefore, few Army decision makers outside of unified command or combined operations headquarters had direct access to weather satellite products. There were no DMSP readout sites with Army units stateside. Although the 5th Weather Wing's 1st Weather Squadron had an AN/TKR-1 APT receiver to support USREDCOM, it could not acquire data from either DMSP or ITOS series satellites. Neither could the 7th Weather Squadron's AN/TKR-1 used to support USAREUR. DMSP data was available to Headquarters USEUCOM (the commander in chief of which was an Army general) via the "mini"-SIDS from the Bann site, but not to field army or corps decision makers. The same held true for Korea: DMSP products were transmitted from the DMSP site at Osan to Yong San where Headquarters Eighth Army was located, but Army decision makers below that level did not have direct access to data from either DMSP or civil satellites.

Additionally, the DMSP sites at Bann and Osan had not been modified to enable readout of data from civil satellites--an extremely important consideration in that, by 1977, civil polar-orbiting satellites were providing pictures with a resolution comparable to DMSP pictures, and because the performance of DMSP satellites (and hence, the availability of data) from 1975 through 1977 was marginal at best. In Alaska and the Panama Canal Zone the DMSP readouts were located on Air Force bases and, while the former site was modified in 1977 to receive data from civil satellites, there was no capability at Howard AFB to acquire civilian satellite data.[86]

In summation, while the Army's experience in Vietnam dictated a need for direct access to satellite data by its commanders in the field down to at least the corps level, none had it by 1978. Despite the tactical use that might be made of the products, AWS believed that direct satellite readouts available in 1978 were too costly, not mobile or rugged enough, and took too many people to operate to be of practical value to corps operations.[87] In a letter of 22 November 1978, the Department of the Army disapproved USAREUR's ROC for a direct tactical satellite readout capability.[88] The Army discontinued efforts to obtain the Mark IV DMSP vans for support of corps and divisions. Its new position, as 1978 closed, was that it was AWS' responsibility.[89]

Tactical Area Weather Sensors

EROWS

In early 1965 the meteorological working group of a tactical air capabilities task force published a report which was submitted to the TAC commander and the Air Staff. It recommended the development of an expendable, remote-operating weather station--capable of recording and transmitting temperature, humidity, pressure, and wind speed data--that could be air dropped into enemy territory. In July 1965 AWS sent for AFCRL's review a revision of a QOR (Qualitative Operational Requirement, the forerunner of the ROC system) for such a station drafted by the 2d Weather Group--forerunner of the 5th Weather Wing. AFCRL felt that it was "feasible," and that a prototype could be developed and tested for $180,000. On 26 August 1965, AWS submitted the formal QOR to MATS (Military Air Transport Service--the forerunner of MAC) who, in turn, forwarded it to the Air Staff on 18 October 1965. The Air Staff sent it to the major air commands for comment. Based on the replies, the Air Staff, in May 1966, sent to AWS and AFCRL for consideration a slightly revised document. AWS went along with it. So did AFCRL--who estimated that it would take $350,000 to develop, procure, and test fifteen-to-twenty such stations.[90]

Meanwhile, all of the recommendations and comments regarding the Air Staff's revised document were incorporated by TAC into a ROC issued on 23 September 1966 for an EROWS--Expendable, Remote-Operating Weather Station. TAC's ROC mentioned an Army QMR (Qualitative Materiel Requirement) for a PAWOS (Portable Automatic Weather Observing Station), and stipulated that the differences between it and EROWS be resolved so that a single system could be manufactured to satisfy both the Army and the Air Force.[91]

After failing agreement with the Army, the Air Staff published its own ROC for EROWS on 7 August 1967. It was identical to TAC's ROC except that an EROWS was to weigh 100 pounds less. In a RAD (Requirements Action Directive) published on 18 November 1967, the Air Staff directed AFSC to have EROWS operational by June 1969. On 4 January 1968, AFSC passed the action to its Electronic Systems Division, who estimated it would be February 1970 before twenty EROWSs and a master station could be operational--all at a total cost of $245,000. Some differences developed between the Electronic Systems Division and AFCRL--of USAF's Office of Aerospace Research (OAR)--over whether EROWS should be a "man pack" station or air droppable. AWS' opinion was sought. Although the set would be incapable of measuring cloud heights, visibility, and precipitation amounts, AWS favored AFCRL's air droppable EROWS--which would measure temperature, pressure, humidity, and winds--and recommended in mid-1968 that it be pursued through development of a test model.[92]

A year later, on 17 July 1969, the Air Staff issued another directive ordering AFCRL--vice the Electronic Systems Division--to develop an EROWS based on the Air Staff's ROC of August 1967. Some of the Air Force's fiscal 1973 RDT&E (Research, Development, Test and Evaluation) funds were earmarked for EROWS, and in May 1971 the Air Force was estimating for Congress that $215,000 in RDT&E funds would be needed for fiscal 1971 and $220,000 for fiscal 1972.[93]

In the interim, in late 1969, and on 23 April 1970, the Air Staff asked AWS to review its need for EROWS. After polling its field units, AWS preferred graciously withdrawing its requirement because EROWS would not measure cloud ceilings, visibility, and precipitation amounts. However, for political reasons--the potential risks to other research and development programs AWS wanted, if it turned thumbs down on EROWS after the Air Staff had approved, and committed funds to, its development--AWS felt it was inadvisable to do so. Therefore, it was decided to have AFCRL continue with EROWS' development.[94]

In mid-1970 the Air Staff granted AFCRL permission to develop a prototype EROWS, and a contract was awarded to North American-Honeywell's Government and Aeronautical Products Division, St. Petersburg, Florida. The operational concept for EROWS was for a sensor package to be implanted by air or manually. Transmission of data from the package was to be relayed via aircraft to a data processing receiver. Operated by battery, and theoretically capable of transmitting data up to 200 miles, the 85-pound EROWS contained a central recorder for interrogation and was to measure temperature, winds, pressure, precipitation, and cloud cover.[95] Category II testing, scheduled for November 1971 at Patrick AFB, was slipped to early 1972. Test results were marginal; many phases of the test were not completed due to failure of the components. On 10 February 1972, the Air Staff once again asked TAC and AWS to rejustify the need for EROWS.[96] TAC responded that it could not support further development unless EROWS possessed a capability to measure cloud ceilings and visibility.[97] The AWS Program Review Committee rejected EROWS as a viable solution to the problem of cloud ceiling and visibility measurement in denied areas of the battlefield. "The reason why . . . Air Weather Service was turned off on EROWS acquisition," the AWS commander remarked later, "was that it neglected the problem of communicating weather information from the battlefield back to where a decision-maker could use the information."[98] Thus, at a meeting in the Pentagon on 23 March 1972, the Air Staff decided to cancel EROWS. There had been a cost overrun of $180,000 and the contractor was seeking another $230,000--which the Air Staff decided was just too much. In a message the following day, the Air Staff directed "termination action on contracts for development" of EROWS "based on new requirements not now provided in the development plan and not available within the state of the art."[99]

BATSS and PRESSURS

With the Air Staff's decision of March 1972, it was "back to the drawing board," for all parties concerned. At the time an ad hoc committee of the Air Force's Scientific Advisory Board was looking at the problem of remote sensing techniques in support of tactical air operations, and in a report published in December 1972 recommended use of the Igloo White sensors--employed during the war in Southeast Asia--or RPVs (Remotely Piloted Vehicles) to acquire battlefield weather information.

TAC immediately began revising the Air Staff's EROWS ROC of August 1967 into a new ROC for a Tactical Remote Environmental Sensor System (TRESS) which it distributed for coordination among the major air commands in May 1973. USAFE and PACAF blessed it, but AWS and MAC recommended it be consolidated into a joint ROC with one AWS drafted. TAC agreed and, in January 1975, sent to MAC the draft of a Tactical Area Weather Sensor (TAWS) ROC which had been coordinated with PACAF and USAFE.[100]* Basically, the TAWS ROC called for measurement of the same elements EROWS did--winds, cloud cover and ceiling heights, precipitation, pressure, temperature, humidity, and weapon-to-target visibility. MAC directed AWS to prepare a concept of operations for TAWS. Two concepts were considered: one for an airborne system and one for a ground-based system. Because the Army's TESS (Tactical Environmental Support System--discussed below) addressed the need for battlefield weather observations, AWS decided to investigate the possibilities of a joint Army-Air Force or MAC-TRADOC ROC. The Army was developing a Remote Automated Weather Station (RAWS) to meet the shortcomings identified by TESS.

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*The coordinating draft of the TAWS ROC is included as Ref 1 to the Jul-Dec74 history of the Aerospace Rqmts Div, Directorate of Aerospace Services, DCS Aerospace Sciences, HQ AWS--itself included as Tab #4 in Vol V, "Supplements," of *History of Air Weather Service*, 1Jul74-31Dec75.

In March 1976, Brigadier General Rowe agreed to a proposal by his staff to split the TAWS ROC into two ROCs. One would address airborne sensors to measure elements in support of Air Force operations, but would also include some Army weather support requirements. The second ROC would address ground-based sensors that satisfied Army requirements but were difficult to justify to MAC and the Air Staff for support of the Air Force mission. The two ROCS were drafted in 1976: BATSS (Battlefield Targeting Support System) for an automatic unmanned, ground-based system that could be deployed manually or air dropped; and PRESSURS (Pre-Strike Surveillance/Recon System) for an airborne sensor system. The preferred solution to the BATSS ROC was the Army's RAWS. The PRESSURS ROC envisioned the use of RPVs to carry weather sensors into battlefield and target areas.[101]

By July 1977 drafts of both ROCs had been coordinated with the weather wings, and on the eleventh, the AWS Program Review Committee tentatively approved them for forwarding to MAC. But Brigadier General Rowe harbored reservations. He questioned tying PRESSURS to RPVs when the Air Force, in the intervening three or four years, seemed to have downplayed their future role in air operations. He also pointed out the difficulty of measuring cloud ceilings and visibility in the battlefield area. In line with his policy to have the Army assume a larger role in meeting its weather support needs, as addressed below, Rowe decided that AWS would rely on the Army's RAWS to satisfy the Army's minimum essential support requirements. Therefore, he ordered his staff to terminate the BATSS ROC.[102] In addition, he directed that a "tiger" team be assembled from his staff to study the state-of-the-art of remote measurement of cloud ceilings and cover and slant-range visibility in the battlefield area.[103]

Brigadier General Rowe's staff rewrote the PRESSURS GOR and it was forwarded under the AWS commander's signature to MAC on 1 May 1978.[104] It was approved by the MAC Council on 27 October 1978 and relayed to the Air Staff on 28 December 1978. However, the outlook for both PRESSURS and RAWS was not very promising because it was highly unlikely that the Air Staff would allocate money for the former system,[105] and the Army was already choking RAWS to death by curtailing funds.[106]

So, after thirteen years, AWS still did not have a tactical area weather sensor system to handle either Air Force or Army requirements.

Communications

AWS believed that uninterrupted, two-way communications between weathermen at all Army echelons in the field were absolutely basic to providing acceptable service. Weather communications were always the life blood of any weather support structure; without them the structure collapsed. Degraded weather communications degraded weather support. It was axiomatic. Yet with the experience of three shooting wars, a handful of hot crises, and hundreds of field exercises and maneuvers at home and abroad, weather communications invariably loomed as *the* most menacing impediment to successfully supporting the Army.

And it was not as if weather communications were not recognized as *the* key problem in weather support to the Army, because they were. They were cited as a major drawback by the Army studies addressed below, Met-70, Met-75, and TESS. They surfaced as a principal item during an Army tactical commanders' weather requirements conference at Fort Leavenworth in August 1977. Indeed, they were a prime topic of debate at each of AWS' Army weather support conferences, and each meeting of the AWS-Army joint working group on weather support to the Army, from the Seventies' first one in April 1970 to later gatherings in 1977. And within AWS they were acknowledged as a perplexing nuisance, be it those at the top associated with weather support to the Army, or the lowest ranking airman in the field trying to get an observation back from the brigade he was deployed with to the division command post. During an interview in mid-1978, Brigadier General Rowe, the AWS commander, acknowledged that it was a key problem because "communications are the life blood of our business."[107]

For some observers it was difficult to fathom why weather communications were such a bugaboo in supporting the Army when the governing joint regulation seemed straightforward enough in delineating the Air Force's and Army's responsibilities. Basically it stated that, in garrison at Army installations, the Army would provide, install, operate, and maintain "mainframe termination and on-post weather communications circuitry," while the Air Force would provide, install, operate, and maintain the terminal communications equipment.[108] For tactical army forces in the field, the Air Force would take care of everything down to the field army headquarters, while the Army would handle all of it below that level--*except* when the communications terminal equipment was unavailable from Army resources, at which time, or under such conditions, the Air Force would furnish it. The Army was also responsible for providing and maintaining the necessary facilities for disseminating weather information to Army users. Recognizing that situations might arise requiring adjustments to the responsibilities established above, the joint regulation authorized Army and Air Force officials at the local level to iron out mutually agreeable solutions.

What, then, were the problems? Most of those related previously, that resurfaced during Vietnam, lingered through 1977. Additionally, to many in the Army the joint regulation meant little. TOEs were everything. If it was not authorized in the TOE it was not provided. Thus, it became incumbent upon AWS weathermen at the local level to insure that TOEs for each Army unit they supported included the needed weather communications gear. Some of the communications equipment made available by the Army and Air Force was incompatible. Army teletype, for example, was operated at sixty words per minute, while Air Force teletype was operated at 100. Pertinent documents[109] authorized full-duplex (send and receive) facsimile support to corps and division, and applicable TOEs listed a specific piece of tactical facsimile equipment (the AN/GXC-5). But the Army had few such sets available in its inventory. In some instances, notably with airborne and airmobile operations, weather teletype equipment was too heavy and bulky for use at the brigade level. AWS believed that the Army Signal School at Fort Gordon was overly indifferent about solving the problems. It also felt it could not rely on one mode of communications; rather, it needed two independent methods to maintain the continuity of weather data bases at each echelon of the Army supported. Because Army units in the field moved about frequently, AWS thought it needed HF radio communications. Multi-channel teletype authorized from division command posts or operations centers to brigades and airfields was not adequate in a fluid environment.[110] Yet there was indecision within AWS as to precisely what type of communications capability was needed at each echelon of the Army it supported. For instance, some believed full-duplex facsimile service was needed down to corps and division level, and others did not; and there was indecision among those who did as to whether the same type of facsimile service was necessary for armor or infantry units as for airborne or airmobile units. And AWS was not of one voice, as addressed in the following chapter, as to whether it was better to have the communications gear needed by its weather teams incorporated into Signal or Intelligence TOEs.

With weather communications so vital to support of the Army, and with so many of the problems occurring again and again over the years, one might question what was being done by AWS to overcome them. One of the first and most important attempts was to speak with one tongue, as to precisely what weather communications service and equipment was needed. In late 1974, the 5th Weather Wing attempted to develop a consolidated position with the 2d Weather Wing, the 7th Weather Squadron, and AWS. After reviewing the problems above, the wing suggested that teletype might not be needed at brigade, that FM radio voice communications dedicated to weather could meet the brigade weather team's needs; and that the dedicated, full-duplex weather telepype and facsimile authorized in appropriate TOEs was still required between division and corps weather teams.[111]

In early 1975, AWS developed a coordinated position on the subject of Army weather communications. AWS recommended that: existing TOEs be changed to identify a radio teletype augmentation package as an "organic" asset for use by weather support units in mobile or fluid operations when multi-channel teletype was unavailable; that radio communications be made available for intra-division use since teletype was rarely available to transmit weather information; and that receive-only facsimile should be put back in corps and division TOEs for weather support.[112]

In early 1976, the 16th Weather Squadron notified the 5th Weather Wing of its concurrence with the 2d Weather Wing and 7th Weather Squadron that weather teams at division had a valid need for a tactical facsimile capability. For the present, it recommended buying the AN/GXC-7A. The Army had eight AN/GXC-7As but, while it recognized that it was superior to teletype for transmission, TRADOC was not too interested in purchasing more because it had a major drawback of requiring four-to-six minutes to transmit a single page. TRADOC was looking to a tactical digital facsimile capability by 1982, and the biggest hurdle to it acquiring more AN/GXC-7As in the interim was a lack of money.[113]

In regard to weather teletype, TRADOC, in late 1976, was directed to delete the AN/UGC-74 and 75 teletypewriters from all TOEs because development had stopped and the Army would not be buying any. By mid-1977, after the teletypewriters were deleted from the TOEs, weather teams with Army tactical units were unable to requisition any tactical teletypewriters because the TOEs had not been updated to provide an interim or replacement teletypewriter. Therefore, in August 1977, it was decided to revert to using the older Kleinschmidt AN/FGC-25 and 25X teletypewriters which could handle the Air Force's 1C word-per-minute capability. As a result, by September 1977, the TOEs were updated to provide the AN/FGC-25 and 25Xs for use by the weather teams.[114]

Late the next month, therefore, October 1977, the 5th Weather Wing advised the 5th Weather Squadron that it would have to face up to the fact that it was destined to live with the AN/FGC-25 and 25X teletypewriters until the early 1980s, and that it would have to put up with the Army's limited capability to maintain them. The wing passed along the following steps taken by the 7th Weather Squadron in Germany to overcome such impediments: brief the battalion Signal maintenance officer and other officials at every opportunity regarding the problems, and make the Signal commander an addressee on all after-action or post-exercise reports; keep a copy of the teletypewriter technical manual on the meteorological vans they took to the field with; identify those spare parts which tended to fail most often and have Army supply people stock them; and operate the machines at least a week before deploying to the field, and as soon as they were in the field, to pinpoint problems early and get a jump on fixing them. "This concerted effort by all the SWOs [staff weather officer] in Europe significantly improved the teletype maintenance service in both the field and garrison," the wing concluded. "The real key was talking and writing the problem through the Signal community," because the "Signal commander was quick to respond when he saw his battalion appear in the after action reports."[115]

Such methods unquestionably helped, but tactical weather communications continued to be the biggest headache for AWS weathermen supporting the Army in the field. During the annual Reforger exercise in Europe in the fall of 1976, the tactical weather communications system below the corps level failed because units moved too often, the weathermen had too low a restoration priority, and because Army Signal units had too little time to make multi-channel connections between the corps operations center--which was stationary--and the units subordinate to it which were constantly on the go.[116] Weathermen from the 5th Weather Squadron deployed to Europe with the 101st Airborne Division and reported that the lack of multi-channel communications between weather teams at the division operations center and the brigade limited the use of brigade weather teams to taking an observation and passing an occasional forecast when available.[117] Six months later, during the Wintex exercise in Europe of March 1977, communications at the corps level and below was unreliable (although FM radios worked at some levels), and the massive volume of message traffic at USAREUR and CENTAG headquarters delayed receipt of AFGWC (Air Force Global Weather Central, Offutt AFB, Nebraska) products by as much as twelve hours.[118] And during the Reforger exercise in the fall of 1977, weather communications were still a problem, except for FM radio. The staff weather officer continued to spend too much time troubleshooting his communications problems at the expense of supervising weather support. Attempts at intercepting weather data broadcast from the Croughton ADWS (Automated Digital Weather Switch) in England at 100 words per minute in the HF mode were unsuccessful, for the most part.[119]

The situation was much the same in Korea. During the Paul Bunyan crisis of August 1976 weather communications held up, but they were recognized as being vulnerable and none too reliable, and the Army units really did not deploy or move about enough to tax the teletype or facsimile systems.[120] Exercise Team Spirit early the next year underscored the problems once more.[121] Efforts were introduced in 1977 to overcome weather communications vulnerabilities in Korea--including relying on Navy links to Korea via commercial communications satellites, and broadcasting weather teletype and facsimile maps via HF radio from Yokota Air Base in Japan. But after two years, and a lot of foot shuffling and buck passing by commanders and communicators in all three branches of the military, weather communications in Korea in 1979 was still a rickety hodgepodge emanating every indication it would completely collapse under all but the slightest of strains.[122]

At top, during Gordian Shield phase of Reforger 76 (September 76), in support of the 1st Armored Division, 1/Lt Gene A. Balantyne (left) receives orders for combat weather team of Det 12, 7WS, to move out, as Sgt Peter Delork (center) and SSgt Manfred K. Hellwagner prepare to patrol perimeter. The team operated from 2.5-ton van in background. In bottom picture, 3d Infantry Division staff weather officer's camouflaged location during Wintex 77 (Mar 77).

At left, Capt Wilbur G. Hugli, commander of OL-C, 7WS, briefs members of 2d and 4th Infantry Battalions during Exercise Alpine Friendship 77--a joint unconventional warfare maneuver in southern Bavaria in April-May 1977.

At bottom, Sgt Eugene S. Roberts, Jr, OL-C, 7WS, radios landing zone winds to assault helicopters during Alpine Friendship 77. (USAF Photos)

MSQ-10 - and the Tactical Weather System

After tests with the Datalog DL-19W analog facsimile equipment were successfully completed in Europe in March 1976, the Air Staff directed AFCS (Air Force Communications Service) to terminate efforts with the trouble-plagued Weather Graphics System and use the DL-19Ws to satisfy AWS' weather dissemination requirements on the continent.[123] Upon the 2d Weather Wing's urging, AWS then approached AFCS about leasing deployable DL-19Ws for Army support.[124] After several delays, the DL-19W facsimile system in Europe--including the gear at 7th Weather Squadron sites--was accepted early in December 1977, but several problems arose during subsequent operational testing and evaluation.[125]

At about the same time, AFCS units in Europe began receiving the long-awaited Tactical Weather System--although they had yet to be declared operational. The requirement for such a system was formally established by TAC (Tactical Air Command) in the 1960s (who also purchased it), and it was designed to support tactical air forces during operations from "bare bases."[126] It was recognized that the Tactical Weather System was not designed to support the Army, but due to the incessant tactical communications problems associated therewith, AFCS officials in Europe agreed to test it for use in Army support during the 1976 Reforger exercise. The Tactical Weather Analysis Center (TWAC) modules of the Tactical Weather System were used in place of the MSQ-10 mobile communications van by the weather support unit deployed with USAREUR--the field army. The TWAC proved to be incompatible and unsuitable, although it was able to intercept the HF facsimile broadcast from the Croughton ADWS, which the 7th Weather Squadron considered a major breakthrough in its attempts to obtain a tactical link from the field army to the AWN--Automated Weather (Communications) Network.[127]

For the 2d Weather Wing and its 7th Weather Squadron it left them a situation pregnant with problems. The MSQ-10 vans were to be turned in by AFCS once the Tactical Weather System was officially declared operational. The MSQ-10 met part of the wing's needs in support of the Army (the USAREUR weather support unit), but not all of them, and not only was the TWAC not designed for Army support, and proved so during the 1977 Reforger, but it was committed to the contingency requirements of tactical air forces. Nevertheless, the wing and squadron were prepared to accept the deficiencies of the Tactical Weather System's TWAC because it provided a partial capability for use today to fill a void in the mobile weather communications capability in Europe. Thus in the early summer of 1977, the wing asked AWS to endorse its need for a dedicated TWAC for use by the 7th Weather Squadron in supporting the tactical field army.[128]

AWS rejected the idea on the grounds that there were too few TWACs, they were needed to support tactical air forces, and they presented too many problems when used to support the Army. Moreover, to have supported the 2d Weather Wing would have meant reversing the position AWS was then taking with AFCS and the Air Staff that, rather than considering the Tactical Weather System (or any part thereof) as a replacement for the MSQ-10, a separate replacement for the MSQ-10 was needed, designed specifically for Army support.[129]

In a reply to AWS of 7 June 1977, the Air Staff addressed two key areas: getting weather information to the highest Army echelon in a given theater, and the responsibility for providing weather communications equipment to Army tactical units below that level in the field. The Air Staff recognized the Air Force's responsibilities under the joint regulation to introduce weather data required by AWS units for direct support of tactical army units into the Army system in each theater of operations. It also conceded that the Tactical Weather System's TWAC could not routinely be used for Army support, and that AFCS was not manned or equipped to continue use of the MSQ-10. Thus, the Air Staff suggested that AWS set down its needs for weather data at the theater level for Army support, and let AFCS determine how best to meet them. For the interim, the Air Staff directed AWS and AFCS to "implement mutually acceptable . . . arrangements." Beyond the theater entry point (the field army), the Air Staff's avowed goal was to eliminate any requirement for the Air Force to provide weather communications gear to support tactical Army units in the field. At the time, the Air Staff understood that it was a mixed bag; that in most cases the Army provided tactical teletype and receiver capability while the Air Force provided the facsimile, using the equipment installed at the garrison location of the Army unit supported. The Air Staff was also aware that AWS disliked such arrangements, preferring instead the development of a mobile communications capability to support tactical Army units deployed in the field. Accordingly, the Air Staff ordered AWS and AFCS to ascertain precisely what was needed--in weather data and weather communications equipment--at each Army echelon supported, after which the Air Staff would ask the Army to meet them under the joint regulation's provisions.[130]

During a meeting with AFCS early the same month, June 1977, attended by both Brigadier General Rowe and the AFCS commander, AWS made a presentation on the problems it had supporting the Army because of weather communications deficiencies. After discussing communications responsibilities under the joint regulation, AWS was taken aback when the AFCS delegation replied that the term "Air Force" in that directive did not necessarily translate into an AFCS responsibility--although AFCS was vague about who else within the Air Force could handle the job. When AWS, in testing the water, made a pitch for AFCS' assuming the responsibility for all communications in the tactical arena down to and including the corps level, the AFCS commander hesitated, saying his people would take weather communications to the highest Army echelon in the theater and no lower. However, AFCS did offer to act as the communications intermediary with the Army.[131]

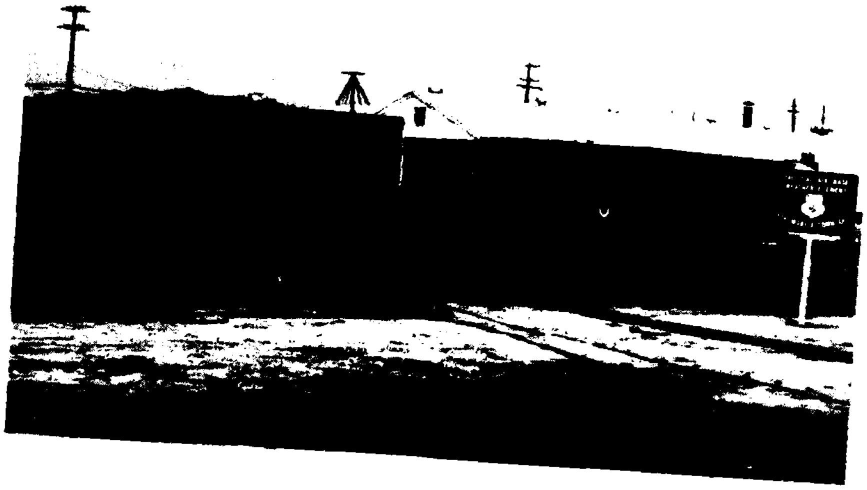
The question surfaced again in October 1977 when AWS, as discussed in detail below, was asked by the Air Staff to comment on a proposed rewrite of the joint regulation drafted by the Army. Seeing it as an opportunity to focus the Army's attention on critical issues, Brigadier General Rowe had the AWS staff draft its own rewrite. Among other fundamental changes, AWS proposed that direct Air Force and AWS support (to include providing needed weather and weather communications equipment) to tactical Army forces be chopped off at the corps level, and that the Army be made responsible for all direct support below that echelon. As to weather communications at Army installations, AWS opted for the status quo: the Army would take care of "main-frame termination" facilities and on-post weather communications circuitry, while the Air Force would be responsible for terminal communications equipment. But for Army forces employed in a tactical theater of operations, which represented the guts of the issue, the Air Force would be responsible for all weather communications (equipment and circuits) down to the corps,[132] while the Army would be responsible for disseminating AWS products to Army elements below corps, and to those Army echelons above corps not receiving direct weather support.[133]

The Army's position was that, one, its tactical teletype equipment was compatible with the Air Force's and, two, AWS wanted to channel entirely too much data to its weather teams at corps and division level. Army teletype machines could be operated at 100 words per minute, but they were old and broke down quicker at that speed. In Europe, furthermore, both the Air Force's 100 and the Army's 60 word-per-minute systems would soon have to be modified because it had been decided that the standard NATO teletype operating speed would be 66 words per minute. A meeting in March 1978 between representatives of AWS, AFCS, and TRADOC confirmed that it was technically feasible and practical to transmit Air Force weather data at either 60 or 66 words per minute.[134] It was proved by the 5th Weather Wing during a communications training exercise at Robins AFB, Georgia, in June 1978.[135] The exercise also confirmed again that teletype and facsimile data transmitted by HF radio could be intercepted by a TWAC with the weather support unit at the field army level, and that teletype and facsimile data could be transmitted via HF radios from the TWAC to corps headquarters hundreds of miles away--which, in turn, could further disseminate the teletype data to divisions and separate brigades at distances up to 2,000 miles.

Not only was it possible to get by without landline weather communications on the battlefield, the Army wanted AWS to tailor its Army support products and thereby reduce the quantity of data AWS funneled through landline teletype circuits. It was the Army's contention that AWS forecasters were habitual "data hogs"--they insisted on more data, and the more they got the more they wanted. Moreover, the data received by AWS weather teams supporting deployed tactical Army forces was essentially the same "dump" of information provided Air Force bases serviced by fixed communications; and the "dumped" data they got was oriented to support Air Force operations rather than Army tactical requirements. Due to the nature of ground warfare, Army tactical units were mobile. Communications were unavoidably disrupted as Army units flowed with the tide of battle. Yet AWS wanted Army tactical communications equivalent to the quality (and capable of passing the quantity of data) of Air Force high-speed fixed communications--a capability the Army could not begin to furnish its own commanders, let alone weathermen.[136]

As a means of reducing the load on its tactical communications systems, the Army, through its liaison officer to AWS, recommended that AWS tailor products to meet the Army's tactical requirements. Brigadier General Rowe charged his staff to look into the alleged "data dumping" at corps and division, but the AWS staff moved slowly. Rowe retired in August 1978 without ever receiving a response because the Army position fell on deaf ears. AWS continued to insist that it could satisfy the Army's tactical requirements only if the Army provided tactical communications and terminal equipment comparable to that it enjoyed at Air Force bases.[137] When Rowe's successor as the AWS commander, Colonel Albert J. Kaehn, Jr, visited Europe in September 1978 and paid a courtesy call on General George S. Blanchard, the USAREUR commander told him he was very upset with the tactical weather communications imbroglio there, and that he had ordered his Signal commander to personally address himself to the situation. However, Blanchard informed Kaehn that AWS had to reduce the time needed to pass weather data in tactical situations, and one way of doing it was for AWS to tailor its Army support products and quit "dumping" data.[138]

To further compound the perplexing problems in Europe, AWS and the 2d Weather Wing switched positions with regard to the TWAC: AWS wanted to give it a shot in Europe, while the wing expressed reservations about



Exterior and interior view of the tactical air base weather element of the Tactical Weather System. (USAF Photos) the concept AWS envisioned for employing the Tactical Weather System on the continent. The Tactical Weather System was at long last declared operational on 1 August 1978, and indications from AFCS were that no follow-on to the MSQ-10 was being programmed. Recognizing that the original concept of operations for the Tactical Weather System called for it to be used solely to support tactical air forces at "bare bases," AWS, in late 1978, proposed revising that concept to give the system a "secondary" mission: use of its TWAC for communications interface at the field army level. In September 1978, while Colonel Kaehn was in Europe, the 2d Weather Wing formally advised AWS that it could not justify a TWAC in theater. AWS decided to wait for AFCS' and the Air Staff's reaction to the idea of a "secondary" mission for the Tactical Weather System.[139]

As 1978 closed, therefore, weather communications for supporting tactical Army forces in the field were still in an extremely sad state--little better than they had been in Korea a quarter century earlier, and certainly no improvement from the Tet offensive a decade beforehand. Man had learned to communicate with space vehicles on or near the moon or Mars or Venus, but not with weather teams on earth deployed forward with Army tactical units. Because the Army had none, AWS was hauling facsimile machines to the field from the garrison weather stations. AWS and AFCS were improving facsimile by speeding up data flow from 120 to 240 scans per minute, and were looking at digital facsimile (480-720 scan) for the near future. There was no counterpart in the tactical Army inventory. Air Force teletypes were operating at 100 words per minute, while the Army operated its tactical teletypes at 60 words per minute, Air Force weather teletype circuits stateside were 2,400 words per minute, and AWS planned to extend them overseas--yet the Army had no plans for anything greater than a 300-600 word-per-minute capability. It all added up to AWS communications requirements being incompatible to Army capabilities at that point in the field where the responsibility for tactical weather communications was supposed to revert from the Air Force to the Army.

AWDS Era

By the early 1980s, AWS planned to be into electronic graphics with the AWDS (Automated Weather Distribution System) program. Manpower would be saved by automating weather observations at fixed bases; electronic graphics would replace weather teletype and facsimile; and centralized products would be transmitted from AFGWC and a tactical forecast unit in theater to the field. There the local forecaster (the "Advanced Weatherman"--the combined observer-forecaster), equipped with a "mini"-computer in the AWDS terminal, would refine the centralized products and make prognoses to support local tactical operations. The position AWS took on the rewrite of the joint regulation dovetailed with its plans to use AWDS in garrison weather support, and to take it to the corps level in the field where it would function as the focal point for weather support to tactical Army forces. The concept AWS envisioned saw its weather teams at corps equipped with an AWDS capability, providing forecasts--tailored to the needs of subordinate Army units--to the corps Intelligence officer for integration into intelligence material.[140]

Yet AWS could see problems with the AWDS in Army support. AWDS was like the Tactical Weather System in that it was originally conceived to support the Air Force (although from permanent bases), and mainly as an afterthought was serious consideration given to applying it in support of tactical Army forces in the field. AWDS flew in the face of repeated warnings to keep weather equipment for tactical army support simple and unsophisticated and able to function without external power sources. It increased the pressure on reliable and continuous weather communications between AFGWC and the tactical forecast unit and the AWDS at corps. What happened when the umbilical cord to AFGWC was cut? Could the "Advanced Weathermen" manning the corps AWDS go it alone without the crutch that was AFGWC? There would be problems interfacing AWDS with computerized command and control communications systems the Army was investigating for the future such as TOS (Tactical Operations System) or ARTADS--Army Tactical Data System. Would they be compatible with AWDS; could the computers of one system "converse" (would the software be compatible) with another; would there be interoperability? Also, in the tactical role, AWDS only automated data handling functions at corps, which meant that weather teams with divisions or brigades in the field would have to continue taking weather observations manually, with equipment like the AN/PMQ-1s and 4s and the AN/TMQ-22s, until automated observing systems then on the drawing boards, so to refer, were developed--systems such as the Army's AMS (Automated Meteorological System) or RAWS (Remote Automated Weather Station), or AWS' BATSS (Battlefield Targeting Support System). And so, for the interim, there remained the age-old problem of getting manual weather observations from the weather teams at forward divisions or brigades (and those taken by Army elements) back to the corps, and of getting the weather forecasts from AWDS-equipped weather teams at corps to tactical Army commanders below that level--indirect weather support. One solution AWS pushed for was an MSQ-10 replacement.

Another solution was to use Army Intelligence communications channels. The Intelligence officer at division would have dedicated communications channels available, and the Army traditionally treated weather as intelligence. Intelligence communications channels between corps and division could be used not only to disseminate weather forecasts from corps to division or lower, but to relay manual weather observations from the battlefield back to the weatherman at corps.

As covered below, the Army placed considerable emphasis on its Intelligence function in the 1970s, considering it one of the principal ways to offset the superior numbers of enemy forces and weapons in places like Europe. However, because of the number of intelligence sources and the volume of intelligence data on the battlefield, the Army was looking at various ways to rapidly digest, condense, and present it to the local commander. By the close of 1977, the Army had not settled on anything definite. Even then, there was a question of whether weather would be included as a functional element because, due to the priority for other intelligence information, the Army could conceivably rank weather as a "soft" requirement.

Maintenance After the Merger

Under the joint regulation, the Air Force was responsible for maintaining all Air Force owned fixed and tactical weather equipment used by AWS units supporting the Army, and for maintaining Air Force owned terminal and tactical weather communications gear needed by AWS units at Army installations and in the field. Until October 1977, AWS' own weather equipment repairmen performed organizational and intermediate level maintenance on Air Force equipment used in Army support, while AFCS personnel maintained Air Force weather communications equipment. After AWS' weather equipment maintenance mission--

and most of the associated manpower--was transferred by the Air Force to AFCS effective 1 October 1977, the responsibility for maintaining weather and weather communications equipment used by AWS to support the Army fell to AFCS.

Through the years, maintaining weather equipment used in Army support proved to be a very difficult challenge when AWS owned the maintenance men, but after they were transferred to AFCS there remained nagging doubts about AFCS' ability and willingness to perform in wars and crises as capably as it might in peacetime--despite provisions in the maintenance transfer plan covering such areas, and notwithstanding assurances by the AFCS leadership that weather equipment would be maintained as well or better under AFCS as it had under AWS. By late 1977, in Europe for instance, 7th Weather Squadron equipment at USAREUR bases was being maintained by three traveling AFCS maintenance teams based in Germany, and there were few complaints. But how good would it be in two or three years with a complete turnover in personnel, and after the senior enlisted men with experience in weather equipment maintenance transferred to other functions or retired? Therefore, once the bullets began flying, and each of his other "customers" began demanding support, how responsive to AWS' needs--with their traditionally low priority--would the local AFCS commander on the battlefield be?[141] If AWS' past experiences with battlefield communications were indicators, its weather equipment maintenance needs would go wanting.

CHAPTER 6 - TOES: SIGNAL OR INTEL "PROPONENCY"?

When the revised joint regulation (AR 115-10/AFR 105-3) was published in mid-1970, replacing the 1962 version, it contained a new provision whereby the Army was responsible for furnishing AWS weather teams all the supplies and equipment--such as vehicles and communications and weather gear--listed in the Army weather section of the supported unit's TOE--Table of Organization and Equipment.* The provision was in line with recommendations made in the Army's Met-70 study discussed below.** It recognized the fact that, theretofore, AWS personnel enjoyed only limited success in obtaining logistical support from the Army because, even though the joint regulation gave the Army the responsibility, the specific amount and type of equipment needed was not always listed in appropriate TOEs. Therefore, in mid-1970, Headquarters Combat Developments Command (CDC) approved and forwarded for consideration to the Department of the Army seven basic, "11"-series TOEs for Signal elements supporting the field army, corps, and division that covered AWS weather teams at each of those echelons.† The seven TOEs, which had all been approved by the Department of the Army by mid-1972, included all required organizational equipment and supporting Army personnel (two vehicle drivers per corps and division weather team) and communications equipment personnel--nine per corps, six per division.[1] Associated with the TOE action, the 5th Weather Wing, in coordination with CDC, developed special Army tactical communications doctrine that authorized sole user, full-period Army teletypewriters and facsimile circuits linking weather teams at field army, corps, and division levels. With the TOE action, for the first time ever, field army, corps, and division weather teams were authorized to draw, from the Signal element of the Army unit they supported, everything from expandable vans to rifles. In addition, they were authorized dedicated Signal communications circuits in the field, together with Army field radios, teletypewriters, and facsimile machines.[2]

While the problems with Army logistical support in garrison continued, the weather sections in the approved TOEs were a major step toward solving the problem of logistical support to AWS weather teams

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*It also contained a loophole in that the Air Force was responsible for providing mission-essential equipment and supplies to AWS weather teams not readily available through Army supply channels. See AR 115-10/AFR 105-3, "Environmental Services: Meteorological Support for the U.S. Army," 9Jun70, pp. 2-2, 2-3, included as a supporting document to this history.

**Met-70 was the short title for "Organizational and Operational Concepts for Meteorological Service in Support of Army Tactical Operations, 1965-70."

†The seven TOEs were: TOE 11-16G, Corps Signal Battalion; 11-35H, AIM (Armored/Infantry Mechanized) Division; 11-95G, Army; 11-18T, Air Cavalry Combat Brigade; 11-205H, Airmobile Division; 11-215G, Airborne Division; and 11-225H, Airborne Corps.

in the field. Army TOEs and, by the mid-1970s, MTOEs (Modified Table of Organization and Equipment) were absolutely critical to AWS weather teams. If communications were the life blood of weather support to the Army, and observers were the backbone, TOEs were the muscular system.

The TOE was the basic planning guide for the organization of any given tactical Army unit. It defined the unit's mission, and specified the equipment and personnel needed to accomplish that mission. MTOEs considered the peculiarities of a tactical unit's mission, provided organizational flexibility, and aligned people and equipment to meet local conditions of employment. The MTOE was the sole document authorizing Army personnel and equipment. If the MTOE of the Army unit he supported did not authorize the Army equipment and personnel he needed, then the staff weather officer--or the weather team--was not furnished them regardless of what the TOE or any directive--Army, Air Force, or joint--authorized for weather support. If they were not listed on the MTOE, then AWS weathermen could not requisition from Army supply sources such things as vehicles, weapons, and weather communications gear.* Changes to MTOEs had to be initiated at the unit level rather than at higher headquarters. Therefore, staff weather officers and weather teams had to initiate changes to MTOE weather sections through the Army unit they supported, even though all changes had to be coordinated beforehand with the parent weather squadron.[3]

In October 1974, during its second meeting, the joint Army-Air Force working group on weather support to the Army** tasked the 16th Weather Squadron to develop and coordinate mission statements for weather teams needed to support the Army's EAD (Echelons Above Division) decision, and draft MEFPAK (Manpower and Equipment Force Packaging) revisions to meet such missions, as well as coordinate TOE requirements to meet the proposed MEFPAK.[4] The squadron recommended to the 5th Weather Wing that the appropriate TOEs be reviewed and rewritten to reflect the MEFPAK changes necessitated by the EAD decision. In December 1974, 5th Weather Wing began an AWS-wide review of weather sections to Signal TOEs. Because of FORSCOM's interest, the scope of the review grew to encompass every major Army tactical command stateside and in Europe. All inputs were sent to the Signal School and, in addition, an AWS position was formulated with respect to corps, division, separate brigade, and armored cavalry regiment TOE weather sections. In concert with the Signal School's review of the TOEs, 5th Weather Wing began reviewing Army weather support UTCs (Unit Type Codes) to insure Army TOE resources and AWS personnel balanced.[5]

In early May 1975, the Army Signal School at Fort Gordon completed its proposed weather communications concept and TOE changes for corps, division, separate brigade, and armored cavalry regiments, and later

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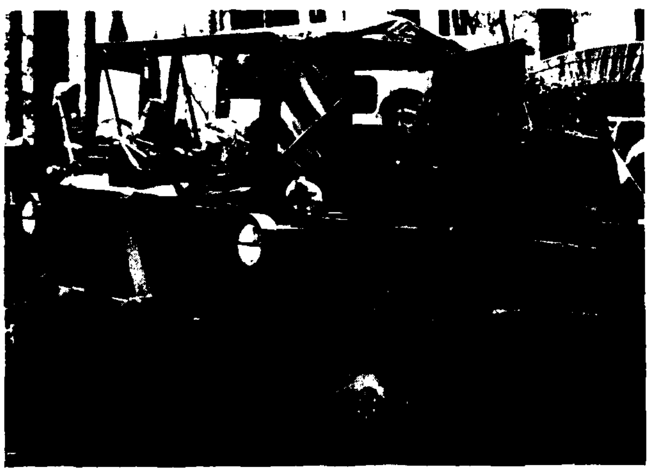
*Even then, the fact that needed equipment was listed on MTOEs was no guarantee that it would be available, as discussed above in the case of weather communications gear. There were repeated instances where equipment listed in MTOEs simply was not available from Army stocks.

**The purpose of the joint working group was to provide a forum to identify weaknesses and deficiencies and propose workable solutions to joint doctrine, concepts, and procedures for weather support related to the employment of Army forces in a theater of operations. Its objectives were to identify mutually acceptable alternatives and, or, solutions to selected parts of identified problems, and to make recommendations for resolving deficiencies. Its scope was limited to



TOE/MTOE-authorized Army vehicles assigned the 7WS's Det 1 in use during Reforger 77 exercise in Germany: in top photos an M-577 track, and at the bottom an M-561 Gama Goat manned by Det 1's TSgt Philip D. Henderson. (USAF Photos by TSgt Philip D. Henderson) that month began staffing the proposed changes with all the Army schools, CACDA, and AWS. AWS directed 5th Weather Wing to respond with a coordinated AWS position. The wing developed working papers which integrated proposed changes with tentative changes in working hours proposed by the Army's TESS study discussed below. It was the first attempt to develop new UTC mission statements and manpower, taking into account the requirement for AWS personnel to operate and maintain equipment furnished by the Army. By July 1975, the wing's working papers had been reviewed by AWS and the 1st and 2d Weather Wings, and work was underway to include UTC statements in official Air Force documents pending the Army's approval of TESS and the outcome that year of the Army's TARS-75 and MASSTER tests.[6]

TARS-75

TARS (Tactical Reconnaissance and Surveillance)-75 was a one-year test, directed by the Department of the Army through FORSCOM, slated to begin in February 1975 with the 2d Armored Division at Fort Hood, designed to evaluate the functional capabilities of the "Division Military Intelligence Company" proposed as a major part of the division Intelligence subsystem. There were two objectives of TARS-75 of particular interest to AWS: evaluate a proposal to attach the division weather team and its TOE equipment to the division's Intelligence company; and evaluate the support provided by higher echelon weather units--e.g., AFGWC-- to the division weather team.

"A peculiar circumstance is becoming apparent," wrote Major Dell V. McDonald, the staff weather officer to CACDA (TRADOC's Combined Arms Combat Development Activity at Fort Leavenworth), to the 16th Weather Squadron in early December 1974,[7]

> On the one hand the Army is moving toward centralizing Intelligence assets as a part of the TARS-75 concept (underway since 1965) and on the other to decentralize assets as a part of FM 286 [the MASSTER test]. To say that the situation is confused at this point is an understatement. The only approach I can propose is that with each of these efforts we make an honest and intensive evaluation of the weather support aspects. Under TARS-75, the FORSCOM evaluation should show the advantages and disadvantages of being integral with the division combat Intelligence company. This of course involves an objective to determine whether the weather element of the Signal TOE should be converted to MI [Military Intelligence] or remain Signal.

The 16th Weather Squadron's position, as expressed by its commander, was that "the unit to which the weather team is attached for logistics and communications is not so important as its placement for support to the TOC [Tactical Operations Center, as tested in MASSTER] and its access to communications."[8] Whatever, the squadron advised the 5th Weather Wing that TARS-75 had "the potential of making the greatest impact on Army tactical [weather] support in the history of Army support."[9]

The 5th Weather Wing was not enthusiastic about TARS-75. It recalled that past problems in Army weather support centered primarily

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**(Cont) immediate or near-term, obtainable goals for improving joint aspects of weather support to the Army.

on inadequate communications, and that the attachment in 1972 of weather teams to Signal TOEs provided the "management tools" to eliminate those problems--resource support and direct access to the staff Signal officer. Moreover, attaching weather teams to Intelligence TOEs would not increase weather communications resources or priorities. A priority would have to be settled between intelligence and weather information, and the staff Intelligence officer would obviously rule in favor of the former. It took almost three years to gain the Department of the Army's approval for Signal TOEs that supported weather teams, and the wing believed that weather's attachment to Signal ought to be thoroughly tested before switching to Intelligence.[10] "We have serious reservations," the wing informed AWS in December 1974, "about the proposed attachment of the weather team to the Intelligence Company, especially the weather TOE equipment which is currently attached to the Signal Battalion."[11]

The concept of attaching the division weather team to the combat Intelligence company, and transferring its logistics and communications assets from Signal to Intelligence TOEs, was evaluated under TARS-75 by the 5th Weather Squadron's Detachment 14, (commanded by Major George L. Frederick, Jr) at Fort Hood, with the 2d Armored Division during exervise Brave Shield XII from 11-through-31 August 1975. The Army's final report noted that the weather team experienced great difficulty getting its authorized equipment; that the Signal battalion was not responsive to the weather team's requirements, and that the requisite equipment was not obtained until the weather team was attached to the Intelligence company. The report concluded that the Intelligence company provided the best support to the weather teams. It recommended that the weather team be attached to the Intelligence company permanently because Intelligence was the element having primary concern for weather data, and it would bring the weather team in closer contact with, and under the control of, the staff element having a vital interest in the weather team's operations.[12]

The anticipated change in "proponency" for weather team TOE support from Signal to Intelligence was discussed at length during an AWS tactical weather support concepts conference held at Headquarters AWS in mid-September 1975. It was brought out that, with his on-the-scene experience, Major Frederick supported the change. A majority of the conferees did also. Under Signal, the weatherman's communications were sometimes arbitrarily commandeered; under Intelligence, Signal responded to Intelligence's requirements, one of which was weather. It was also noted that with the change, all of the TOE weather sections would be written by TRADOC's and CACDA's USAICS (United States Army Intelligence Center and School) at Fort Huachuca. It was decided that, because of a lack of knowledge about TOEs and MTOEs by AWS personnel supporting the Army, AWS would publish a document containing related facts.[13]

At USAICS' suggestion, TRADOC asked the appropriate Army schools and CACDA to review the weather team proponency issue and provide it a position by late January 1976. For the Army, the issue encompassed the consolidation of all but its artillery meteorological function at USAICS, with CACDA retaining overall management responsibility for meteorological matters within TRADOC. While such action would transfer weather team TOE proponency from Signal to Intelligence, it would not negate the Signal School's responsibility to plan and provide communications doctrine to enhance weather support to the Army.[14]

On 17 February 1976, after all the Army schools agreed to the idea, CACDA recommended to TRADOC that proponency for general meteorological and weather combat developments actions be transferred to USAICS, that proponency for ballistic meteorology be retained by the United States Army Field Artillery School at Fort Sill, and that the Signal School at Fort Gordon provide USAICS with technical assistance and insure that the correct Signal doctrine and concepts were applied to development of meteorological systems and weather team TOE sections.[15] On 24 March 1976, TRADOC approved CACDA's recommendation, thereby making USAICS accountable (the "proponent") for weather team TOE logistical and administrative support--Intelligence in place of Signal. USAICS was tasked to transfer the weather elements of Signal TOEs to "H"-series MI (Military Intelligence) TOEs.

By early April 1976, USAICS was officially handling the weather sections of tactical unit TOEs. Its staff weather officer, Lieutenant Colonel James C. Owens, completed and forwarded for consideration to the 16th Weather Squadron and 5th Weather Wing proposed weather sections of TOEs for corps, divisions, air cavalry combat brigades, separate brigades, and armored cavalry regiments*--which were scheduled for publication in September 1976 as changes to existing "H"-series MI (Military Intelligence) TOEs.[16] In July 1976, the Department of the Army approved TOE 30-19H for implementation at FORSCOM units, which meant that the logistical requirements of the division weather team would appear as an element of the combat Intelligence company TOE instead of the Signal battalion TOE--although implementation of the approved TOEs was the responsibility of the operating Army commands.[17] And in February 1977, USAICS forwarded for approval to TRADOC the weather team equipment portions of the TOEs that covered the Intelligence company at corps, and the Intelligence detachments at separate brigades and armored cavalry regiments.[18]

The switch from Signal to Intelligence TOE proponency was not immediately as apparent to AWS units in the field supporting the Army as it was to AWS' staff weather officers at USAICS, CACDA, and TRADOC, primarily because it took considerable time to implement the TOE changes. Lieutenant Colonel Owen Y. Macy, Lieutenant Colonel Owens' replacement as staff weather officer to USAICS, visited Headquarters AWS in late October 1977 and reported afterward to the 5th Weather Wing his amazement that "there are still people in HQ AWS who have not accepted weather support to the Army as an element of Intelligence."[19] But the fact of the matter was that the authorized Army equipment for most of AWS' weather teams was still listed on Signal TOEs because, while the Department of the Army approved the Intelligence TOE at division, for instance, not all of the Army's operating commands chose to implement it. Within FORSCOM, for example, which was supported by 5th Weather Squadron units, Army owned equipment belonging to the squadron's weather teams was still listed in a division's Signal battalion TOE by the close of 1977. In some cases the equipment authorized had never been issued.[20] FORSCOM had opted to delay implementing the Intelligence TOEs until the dust settled from various tests being conducted by the Army--as discussed below--to determine the role and composition of the Intelligence element at division level.

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*They were TOEs 30-18H and 30-19H which covered, respectively, the Military Intelligence Company at corps and the Combat Intelligence Company at division; and TOE 30-14H which covered the Military Intelligence detachments at separate brigades, armored cavalry regiments, and air cavalry combat brigades.

CHAPTER 7 - DIVISION SUPPORT: DIRECT OR INDIRECT?

As mentioned earlier, the Army renewed emphasis on its Intelligence function in the 1970s, considering it one way to offset its disadvantage in men and weapons in places like Europe. An increased role seemed to translate to more Intelligence resources. But after Israel's experience in the Yom Kippur War of late 1973, the Army sought to disperse its assets, particularly at the brigade level, and to reduce the size, locations, composition, and electronic "signature" of its command posts, or operations centers, primarily at division level. Several tests of proposed concepts were conducted by the Army in the mid-1970s, some of which bore on the critical question of whether or not divisions needed direct or indirect--remote--weather support from AWS.

MASSTER Test, FM-286, 1975

MASSTER (Modern Army Selected Systems Tactical Evaluation and Review) was a series of studies directed by the Army to improve command and control systems at and below division. MASSTER Test FM-286 looked at restructuring a tactical division's main command post (referred to as the DTOC--Division Tactical Operations Center) without losing the required functions. It was designed to make division command posts less vulnerable in the face of superior mobile armored forces yet, at the same time, make them more efficient and responsive to the commander.[1]

In November 1974 CACDA was directed to provide the methodology and an evaluator for the weather service aspects of MASSTER FM-286. The proposed concept involved moving the division weather team from the main command post to the division airfield and providing indirect weather support. Major Dell V. McDonald, the staff weather officer to CACDA, was selected as the MASSTER weather evaluator. "I have the initial feeling that the 'deck is stacked,'" he wrote the 16th Weather Squadron in December 1974, noting that the MASSTER test office did not consider weather support essential.[2]

The first increment of MASSTER FM-286 was conducted on 20-through-24 January 1975 with the 1st Cavalry Division (Armored) at Fort Hood. The Army's final report on that test indicated that the division weather team--minus the staff weather officer and an assistant--should be moved to the division airfield, and that the need for complete weather teams with armored and mechanized infantry divisions be reviewed.[3] However, Major McDonald's input noted that the full requirement for weather support was not exercised because only the headquarters elements of the 1st Cavalry Division were fielded, and the division airfield and many other player and controller elements were simulated. It resulted in an artificial arrangement for weather support. McDonald concluded, therefore, that removing the staff weather officer from the division's main command post significantly degraded weather support.[4]

According to Major McDonald, the MASSTER FM-286 test was influenced by the comments of Major General Robert M. Shoemaker, the commanding general of III Corps, who questioned the need for weather

Army Lt Gen Shoemaker and Maj George L. Frederick, Jr during ceremonies on 9Apr76 at Fort Hood, Texas, marking formal dedication of the AN/FPS-77 weather radar there. Shoemaker commanded Fort Hood and III Corps, which included the 1st Cavalry Division (Armored) and 2d Armored Division. In early 1975, Gen Shoemaker commanded the 1st Cavalry Division used during the MASSTER tests. Maj Frederick commanded Det 14 of the 5WW's 5WS, which was responsible for supporting III Corps and the two divisions there. His work with the TARS-75 test during Brave Shield XII at Fort Hood in August 1975 was instrumental in the 2d Armored Division's conclusion that weather teams had to be located in the main division command post to successfully accomplish their mission. (USAF Photo) support to mechanized and armored divisions.* "My present concern," reported McDonald in February 1975,[5]

> is that the attitude existing at Ft Hood on the value of weather support to mechanized and armor division is gaining negative momentum. In my judgment this is caused in part by statements made to the FM 286 group by CG [Commanding General] 1st Cav Div who is now CDR [Commander] III Corps [at Fort Hood which included the 1st Cavalry and 2d Armored Divisions]. It escapes me why this attitude prevails in the CONUS while the US Army in Europe appears to place much higher priority on weather support. It will be difficult to obtain a realistic evaluation of the TARS-75 concept, consideration for follow-on MASSTER testing, and improved weather support to III Corps under this prevailing attitude.

In March 1975 USAICS presented briefings on MASSTER FM-286 to General William E. DePuy, the commanding general of TRADOC, who wanted the staff weather officer in the division's main command post. DePuy believed that the staff weather officer had to be directly involved in the decision making process.[6] Major McDonald learned informally that, in accordance with DePuy's wishes and the MASSTER FM-286 report, Major General John H. Cushman, the CAC (Combined Arms Center) commander at Fort Leavenworth, and Brigadier General Harry G, Hiestand, the USAICS commander, agreed that the staff weather officer would remain in the main division command post.[7]

By June 1975, the final report on MASSTER FM-286 had been reviewed by CAC and CACDA, Major McDonald reporting that,[8]**

> regrettably, the test report will likely go forward to TRADOC as written. An atmosphere prevails which does not lend itself to an appreciation of the value of weather support. The main thrust is to delete many of the support elements which have characteristically been integral support elements of combat forces. The MASSTER report is a typical example of how test results both quantitative and qualitative can be modified by opinion to reflect preconceived opinion.

CACDA forwarded comments--drafted by McDonald--on the MASSTER FM-286 report charging that the test did not reflect the true requirement for weather support because the findings related to division weather support were not supported by either "player or evaluater data," and because they presupposed that weather support could be provided remotely without degrading intelligence support. Therefore, CACDA recommended that weather support to armored and mechanized infantry divisions be evaluated further before being permanently discarded or altered. But for the interim it supported the MASSTER position that the division weather team be fragmented, with the staff weather officer and an assistant at the main command post, and the remainder of the team at the division airfield connected by a dedicated communications link.

The AWS Position

Thus, for AWS, the problem became one of whether to provide remote or direct weather support to divisions. Opting for the latter

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*Maj Gen Tolson credited Shoemaker, who served with the 1st Cavalry Division (Airmobile) in Vietnam in 1970, with being one of the Army's foremost tacticians in airmobility from the early 1960s onward. (Tolson, *Airmobility: 1961 - 1971*, p. 222.)

**For his outstanding work in pioneering the use of climatological data in war gaming at the Army's Fort Leavenworth schools, Maj McDonald won the AWS Zimmerman Award for 1974.

method, the 5th Weather Wing opposed MASSTER's and CACDA's suggestion to fragmentize the weather team because experience with numerous field exercises proved that communications between the main command post and the division airfield were unreliable. The Army's TESS (Tactical Environmental Support System--see discussion below) asserted that AWS' support was inadequate, and the 5th Weather Wing believed that MASSTER's recommendation would further hamstring AWS' support. In adopting a position favored by USAICS, the 5th Weather Wing recommended to AWS in late August 1975 that the complete division weather team operate *near* the main division command post, that some electronic weather gear be dropped, and that the division weather team follow standard Signal concepts for using communications equipment in tactical operations. The wing believed that the place for AWS--hopefully the commander, Colonel Rowe--to formally state its case was during a meeting of the Army's Intelligence Advisory Group slated for late September at Fort Huachuca. "The IAG meeting cannot be overestimated," the wing closed, "since it will be very difficult, if not impossible, to reverse any decisions made by the IAG."[9]

At the 5th Weather Wing's suggestion, AWS convened a tactical weather support concepts conference at its headquarters in mid-September 1975, one purpose of which was to develop a position for the Intelligence Advisory Group meeting. It was agreed that, if the Army preferred indirect support, it would be provided by the weather team at corps. However, AWS favored direct support to division, provided through the Intelligence element by a weather team in full complement *at the main command post*. Furthermore, AWS decided that weather support to separate brigades and armored cavalry regiments would be the same as that tendered divisions, and that a division operating independently of a corps would receive normal weather team manning and be supported by an attached forecasting unit.[10]

AWS knew before the Intelligence Advisory Group meeting that its position faced tough sledding. It was briefed before the meeting by Major McDonald to the officer who would chair it, Major General Morris J. Brady, Major General Cushman's deputy at the Combined Arms Center who ran CACDA.* Brady agreed that the airfield was not a suitable place to support the main division command post, and expressed interest in supporting the staff weather officer at the command post from the corps weather team. He voiced doubt over the need for AWS weather observers at brigade because they added to its electronic "signature" and did not provide cost effective support. In reply to McDonald's point that observations were needed for forecasts, Brady said his men knew what the current weather was but needed to know target weather and, therefore, he wanted AWS to obtain its observations through alternate means.[11]

The Intelligence Advisory Group meeting was held at Fort Huachuca on 30 September through 1 October 1975, and AWS, led by its commander, Colonel Rowe, accepted Major General Brady's invitation to attend. The majority opinion favored the complete weather team and its associated communications equipment at the main division command post, but Brady countered by saying that the Army wanted to reduce the size and electronic "signature" of the main command post. He believed that the weather team should be anywhere but the main command post, and that the staff weather officer have access to it only when the division commander felt the situation warranted it.[12]

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*Maj Gen Brady assumed command of the Combined Arms Center in February 1976, replacing Lt Gen Cushman who took over I Corps in Korea.

When reminded that his position conflicted with USAICS', Major General Brady remained adamant about trimming the size of the main division command post, noting that the weather team's function did not justify its presence there. According to him, the weather team was not around when decisions were being made, and the weatherman's language was not always understood by Army commanders. Yet he acknowledged that forecasts were a major factor in Army operations, and he recognized the need for interface between the staff Intelligence officer and the weather team. Nevertheless, after a discussion between Brady and Colonel Rowe, the Intelligence Advisory Group's position was to locate the weather team, in total, at the division airfield. Additionally, because the need for brigade weather teams was challenged, it was decided to review their role.[13]

One staff officer at HQ 5WW in the mid 1970s who did yeoman work in attacking Army support problems, and who helped develop the position AWS took at the IAG meeting, was Capt Frederick F. Haddad, Jr. Pictured here in Nov77 as a major commanding the 7WS's Det 2 in Germany, Haddad receives the Meritorious Service Medal from the 7WS commander, Col John J. Elliff as Col Donald E. Eckelbarger, the 3d Armored Division chief of staff, looks on. (USAF Photo)

The Intelligence Advisory Group's position not only invalidated the TESS study results, but it contradicted General DePuy's wishes. After the staff weather officer to USAICS, Lieutenant Colonel James C. Owens, called those facts to the attention of Major General Brady and the USAICS commander, it was decided to brief both the TESS results and the group's recommendations to DePuy and let the TRADOC commander determine where the division weather team would be located.[14]

The weather issue did not end there. It surfaced again at the meeting when the 2d Armored Division briefed on the TARS-75 results during Brave Shield XII. As briefed, the test results stated that the weather team had to be located in the division command post if it was to be effective. With that conclusion from the field, the Intelligence Advisory Group became split on the weather issue: field evaluations did not support Major General Brady's position.[15]

As the meeting concluded, the Intelligence Advisory Group acknowledged that the division weather team could not operate effectively when fragmented. Thus, AWS' position was accepted. But there had to be a limit on the number of personnel in the main division command post and, therefore, the weather team had to be at the division airfield or with the division's combat Intelligence company. Thus, Major General Brady's desires were acknowledged. However, in recognizing the local commander's authority, the group concluded that he could locate the weather team wherever he wanted.[16]

The 5th Weather Wing believed that the Intelligence Advisory Group's final position represented the best possible compromise, but one that would be extremely difficult to translate into doctrine. It felt that the presence of Colonel Rowe at the meeting, coupled with the work of Major George L. Frederick (the commander of Detachment 14 of the 5th Weather Wing's 5th Weather Squadron at Fort Hood) on TARS-75, was instrumental in bringing the weather issue to a head. "The fact that the IAG could not actually make a decision on where to locate the weather team does represent some measure of success," the wing concluded.[17]

Because of the Intelligence Advisory Group's stance, the 16th Weather Squadron notified the 5th Weather Wing on 20 October 1975 that efforts to update doctrine in the joint manual (Army Field Manual 31-3/Air Force Manual 105-4, *Weather Support for Field Army Tactical Operations*) would be suspended pending a decision on how divisions would receive weather support.[18] Eleven days later, the squadron asked for the wing's and AWS' comments on the following position: that the staff weather officer was a member of the division staff, under general supervision of the Intelligence Officer, and required access to the main division command post; that he and his weather team would normally be located with the division's combat Intelligence company, except when the division commander wanted direct support at the main command post; and that an observer team would be located at the division airfield and at each brigade.[19] In a reply of 19 December 1975, the wing advised the squadron that the coordinated AWS position was essentially as the squadron presented it. For AWS the issue boiled down to direct support to the division decision maker or degraded support by remote means. "If remote weather support to the division is acceptable to the Army," the wing wrote, "then we desire to provide this support from the corps weather team and save the cost of personnel and equipment currently allocated to the division," and it directed the squadron to have CACDA decide whether the division commander would get direct or remote support.[20]

CACDA's staff weather officer, Major McDonald, thought the issue ought to be settled by the Air Staff and the Department of the Army, and that Army field commanders should take a "strong stand" on the location and configuration of division weather teams.[21] He attended the third meeting of the joint Army-AWS working group on Army weather support, convened at Fort Huachuca on 20-21 January 1976, and reported that that body supported the Intelligence Advisory Group's position above *provided* reference to the weather team being at the division airfield was deleted.[22]

Meanwhile, 16th Weather Squadron officials pressed TRADOC for a decision on how divisions would receive weather support, urging it to adopt AWS' position.[23] General DePuy saw the main division command post--the DTOC--as "one big bull's eye," and many people and their associated equipment were removed to reduce its "signature."[24] Yet the TRADOC commander knew first hand the value of weather support to a division engaged in combat. DePuy, it will be recalled, while commanding the 1st Infantry Division in Vietnam during late 1966, approved the award of the Bronze Star Medal to all eighteen members of a 5th Weather Squadron unit for "exceptionally fine weather support" during Operation Attleboro--reported to have been the most successful to that time in the Bien Hoa area in terms of Viet Cong losses in men, materiel, and base camps.[25] On 30 January 1976, TRADOC verified the weather team requirement for DTOC support, although it did not concur in dropping the distinction between direct and remote support in processing formal SORs--Statement of Requirements.[26]

IOSS

Related to the question of direct or indirect weather support to divisions, and to the weather team TOE "proponency" issue, was the Army's IOSS (Intelligence Organization and Stationing Study), a rewrite of which USAICS finished in February 1976 and forwarded to TRADOC. IOSS recommended how Intelligence units should be organized and operated to support corps and divisions. It was complete to the point that it contained proposed TOEs. In USAICS' rewrite, the AWS weather team at corps would be in the headquarters and operations company of the combat EWI (Electronic Warfare and Intelligence) group; at division, the weather team would be in the headquarters and operations company of the combat EWI battalion. At both echelons the weather teams would work in the combat EWI operations center. In other words, the IOSS rewrite called for direct support from weather teams located in or near the main corps and division command posts.[27]

TCATA CEWI Test, FM-362, 1977

The IOSS rewrite was approved by TRADOC in February 1976. The Department of the Army assigned FORSCOM the responsibility for testing the concept. Formally designated as the "Combat Electronic Warfare Intelligence (CEWI) Battalion (Div), Test FM 362," the test, which was to have taken place at Fort Hood in the fall of 1976, slipped to February 1977 due to "TRADOC-FORSCOM conflicts." By then MASSTER had been redesignated--effective 1 April 1976--as the TRADOC Combined Arms Test Activity (TCATA), and Lieutenant Colonel Owen Y. Macy, the staff weather officer to USAICS, was designated as TCATA's weather evaluator for CEWI Test FM-362.

The initial phase of the test was conducted on 8-through-10 February, and the final phase on 22 March-through 1 April 1977 at Fort Hood during exercise Gallant Crew 77 in support of the 2d Armored Division. The only conclusion from the final test report that caused

AWS concern was that one of the two multi-channel communications circuits between corps and division weather teams should be deleted.[28]

Through 1978, therefore, AWS continued to provide direct support to divisions, as well as to selected separate brigades and armored cavalry regiments. It did so notwithstanding the fact that, in late 1977, while commenting on a rewrite of the joint regulation sponsored by the Army, as detailed in a discussion that follows, it reversed itself by making a startling proposal to limit direct support to the corps level. The Army's position, expressed in a letter to the Air Staff of 26 January 1979, was that[29]

> direct weather service support by the USAF Air Weather Service must be provided to separate brigades, Armored Cavalry Regiments, Air Cavalry Combat Brigades, and Special Forces Groups when requested IAW [In Accordance With] AR 115-12. This position applied to active Army, Army Reserve and Army National Guard units, and assumes that direct weather service support will be continued at division, corps and echelons above corps as currently provided.

CHAPTER 8 - ARMY REQUIREMENTS

SORs

As discussed above, the Army's requirements for direct support from AWS in peacetime were formally handled through SORs--Statement of Requirements. Under the 1970 version of the joint regulation, and the applicable Army regulation,[1] the Army unit needing the support initiated the SOR. Once approved by the Department of the Army, it was forwarded to the Air Staff--the Assistant for Weather, AF/PRW. After the SOR was sent to MAC and AWS for review, the Air Staff decided whether additional Air Force manpower and equipment was needed to satisfy the SOR, and where it would come from.

One problem with processing SORs in that fashion was that it was time consuming. At the AWS tactical weather support concepts conference in mid-September 1975 it was recommended that the coordination time be shortened by eliminating the Department of the Army and the Air Staff from the process, except when additional Air Force manpower was needed to meet the requirement.[2] By the close of 1975, AF/PRW and the Department of the Army had agreed. The new process went into effect with the publication of 2 August 1976 of the revised Army Regulation 115-12, "U.S. Army Requirements for Weather Service Support."[3]

Another problem with the process was that those SORs translating into additional Air Force manpower were often suspect, in the Air Staff's eyes, because most were prepared by, or with the assistance of, the AWS staff weather officers at the particular Army units. Of necessity, in most instances, the staff weather officers became involved because the local Army commander and his key staff officers were generally unaware of the weather support available, and how it could profit their operations. Aware of that fact, AF/PRW sometimes questioned whether the SOR was a bonafide Army requirement or an attempt by AWS at empire building. Because of AWS involvement, the SORs lacked credibility, in the Air Staff's eyes, and warranted close scrutiny.

The situation became particularly acute in the early 1970s when Army requirements mushroomed at the same time the Air Staff and MAC were chopping AWS' authorized manpower by nearly forty percent. At one point, the Air Staff wanted AWS' staff weather officers to drag their feet if an Army unit asked for assistance in putting together an SOR. It placed AWS in a dilemma. General Best, the AWS commander until mid-1973, objected because he felt that all of the Army's requirements must be formalized. Then the Air Staff could inform the Army that there were insufficient Air Force resources to meet Army requirements. Best went so far as to imply that his staff weather officers were not initiating or preparing the SORs for Army units.[4] In fact, however, they were,[5] and in acknowledging that truth, General Rowe, the AWS commander through mid-1978, claimed it posed yet another problem: it resulted in proposing Air Force solutions to Army problems. Army tactical commanders had to get more involved in stating their weather support requirements, Rowe believed.

Because the SOR still had to go to the Air Staff if more Air Force resources were needed, the streamlined SOR procedure above did not eliminate the credibility question for AWS. But Rowe said he had no problems living with it because the same procedure--and involvement by AWS--applied to Air Force requirements for weather support. It was, therefore, the Air Staff's inherent responsibility to rule on the credibility question, and whether or not additional Air Force assets would be allocated to meet formally stated requirements.[6]

Met-70 and Met-75

Due in part to incessant urging by AWS to state its requirements for weather support, the Army commissioned a succession of internal studies designed not only to list requirements, but to identify shortcomings in weather support. AWS' staff weather officers to the Army organizations involved helped prepare the studies.

One such study by the Combat Developments Command's (USACDC) Communications Electronics Agency at Fort Monmouth, was entitled "Organizational and Operational Concepts for Meteorological Support of Army Tactical and Logistical Operations, Army-75." More commonly referred to as simply Met-75, it bore heavily the hand of the staff weather officer there, the 5th Weather Wing's Lieutenant Colonel Malcolm Reid. Met-75 was a follow-on effort to a December 1965 study with a similar title ("Organizational and Operational Concepts for Meteorological Service in Support of Army Tactical Operations 1965-1970," ACN 01647), referred to as Met-70, which, among other findings, recommended establishing TOEs to support AWS weather teams. By 1970 a preliminary version of Met-75 was circulated for coordination, AWS being one organization that reviewed and analyzed it. Met-75 looked at the lack of training on the use of weather information in tactical situations; incomplete weather doctrine, and Army doctrine which lagged behind state-of-the-art advances in meteorology in areas such as satellite and computer applications. Met-75 was approved by USACDC and submitted to the Department of the Army which, in early 1972, expressed satisfaction but recommended that its publication be deferred and incorporated into TESS (Tactical Environmental Support System).[7]

TESS

TESS, which traced its origins to early 1970, was approved for study by USACDC on 24 November 1971. "Proponency" for it was transferred late the following month to the Intelligence Agency (USACDC/-INTA) of USACDC's Intelligence and Control Systems Group at Fort Huachuca--which, in 1973, became the U.S. Army Intelligence Center and School, USAICS. The TESS charter, which originally envisioned the development of a comprehensive meteorological plan for the army in the field for the 1976-82 period, identified three problem areas in weather support to the tactical Army. First, weather support doctrine was incomplete and ambiguous. Secondly, the meteorological state-of-the-art had outpaced weather support doctrine in such areas as satellites, radar, computer applications, and weather modification. Finally, there was a lack of training within the Army on the tactical use of weather support. It was not adequately addressed in the Army's schools, and weather was not integrated into field exercises.[8]

Work on the TESS study continued through 1972 and 1973. Its primary author was Mr. James D. Rustenbeck, the USAICS meteorologist. Once again, Lieutenant Colonel Malcolm Reid played a key role in its development, as did Lieutenant Colonels Marion L. Hershberger and James C. Owens, the staff weather officers--in succession--to USAICS.* All major Army commands and schools expressed their environmental support requirements. A major change in the TESS charter was revealed in late May 1974. Instead of addressing near, mid, and far term deficiencies in weather support, the TESS study advisory group was directed to investigate current deficiencies.[9]

A draft executive summary of the TESS study report was published in August 1974. Among other findings, the TESS study substantiated that:

- "numerous" Army requirements for observing and forecasting support were not being met.
- the scale of weather support to the Army was unsatisfactory.
- current forecasting accuracies were of little value to the Army.
- current and envisioned meteorological products available to support Army tactical units required "significant" improvements in forecasting accuracy and in obtaining accurate weather observations from remote areas.
- 24 hour-per-day forecasting support (as opposed to the 18 hour-per-day support provided by AWS) was needed at division level, 24 hour-per-day observing support (as opposed to the 12 hour-per-day support provided by AWS) was needed at brigade level, and there was no concept for furnishing weather support to the air cavalry combat brigade--when that brigade was independently employed, the Army preferred an eight-man (3 forecasters and 5 observers) weather team furnishing 24 hour-per-day forecasting and observing support.
- the Army wanted weather modification support, to include fog dissipation and rainmaking.
- most Army requirements were mesoscale, but only a "limited number [56] of critical values"--defined as those limits of meteorological parameters that significantly impacted Army operations--for meteorological elements were determined.
- no Army computers were available for making forecasts, and none existed, or were planned for, capable of supporting the Army's total environmental data handling requirements.
- weather communications equipment and concepts were inadequate.
- weather support doctrine in the joint regulation and manual was outdated and ambiguous.
- Army and AWS weather support assets were improperly managed.

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*For his outstanding contributions to TESS' completion, Lt Col Owens won AWS' Best Award for 1975.

- Army officers attending military schools received too little training on weather's impact on tactical operations.

- AWS personnel received little or no training to prepare them for army support roles.

The TESS study concluded that, for the efficient use of all Army and Air Force weather support capabilities, all weather support units should be managed as a single entity. Among other alternatives, it suggested that a single organization be assigned the responsibility for total weather support to the Army--either AWS, an Army Weather Service, or a Department of Defense Weather Service to support all three service branches. It also concluded that it was very difficult to determine specific meteorological limits critical to tactical operations. In many cases only the commander on the scene could determine what was critical meteorologically, depending on mission urgency and importance. Finally, in addition to nine other suggestions, TESS recommended that a weather automatic data processing capability be developed, one candidate being a combination of the Army's AMS (Automatic Meteorological System) and AFGWC; that Army weather communications and data handling systems be designed for compatibility with Air Force systems; that a centralized means to manage Army meteorological assets be determined by the Army and the Air Force; and that additional critical meteorological values be determined by field tests and be incorporated into appropriate manuals as guidelines for tactical users.[10]

The TESS study results were briefed to Generals Cushman and Brady at the Combined Arms Center, Fort Leavenworth, on 13 August 1974, and, according to Lieutenant Colonel Owens, Cushman became "an enthusiastic supporter" of the effort.[11] Early the following month CACDA sent it to the field for comment, Major McDonald, CACDA's staff weather officer, noting that,[12]

> With TRADOC approval of the TESS Study, hopefully in December 1974, a clear definition of US Army requirements and recommendations for improving weather support to the Army will exist. The TESS Study, however, like all studies, will be only as valuable as the implementation of its recommendations. The big challenge from here on is to transform those recommendations into hardware acquisition programs and doctrinal and procedural changes.

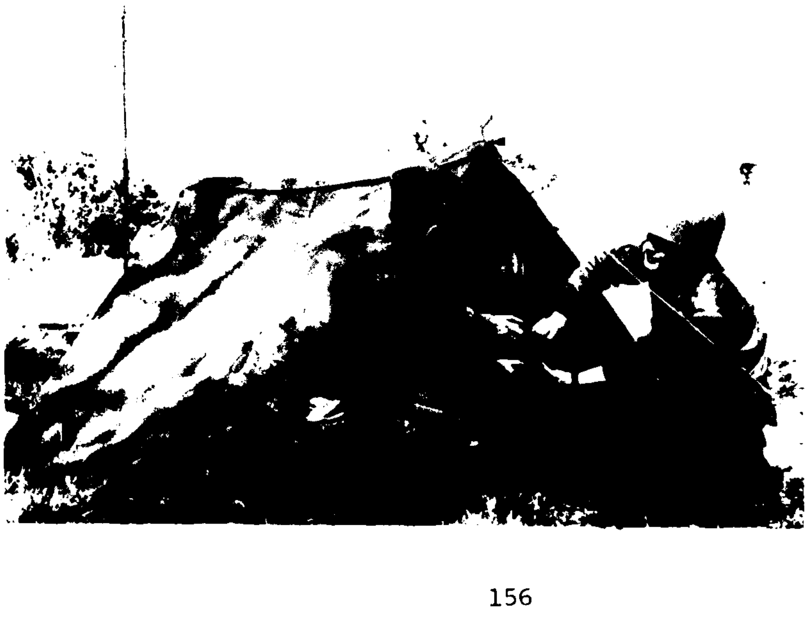
On 20 May 1975, the TESS study was approved by the Combined Arms Center and forwarded to TRADOC for action, Major McDonald reporting that,[13]

> It must be recognized that . . . TESS, . . . once briefed and approved at TRADOC, will provide a solid US Army position on requirements for combat developments and the needs to upgrade overall weather support. Certainly . . . TESS . . . by itself only surfaces and identifies what needs to be done. In my judgment, the AWS must now develop an Army support concept which considers the needs articulated by TESS and its follow-on actions.

MAP/SAMSR

Remarking on the scheduled briefing of the TESS study to TRADOC the following month, the 16th Weather Squadron informed the 5th

One complaint frequently heard was that AWS personnel were not trained to survive with the Army in the field. Men from 16WS adjusting to such life in 1962 are, clockwise from the top: A/2C Jimmy Palmer shaving in the early morning, using his helmet as a wash basin; A/2C Hatcher, AN/PMQ-1 strapped to his back, camouflaging his helmet; an unidentified airman with AN/PRC-25 radio, using a jeep hood for a desk top; and A/1C Alfred Griffis (left) and A/2C Earl Armstrong erecting a "pup" tent. (USAF Photos)



Weather Wing in September 1975 that,[14]

> the timing . . . is not especially good in that the study has been overcome by events. Rotations/retirements of generals more familiar with the study than those presently in a position to bless it have had an effect. Also, actions to reduce the size of the DTOC will impact heavily. TESS is still a good package for the USAF.

The TESS study was briefed to TRADOC on 6 October 1975, and was approved as presented, the 5th Weather Wing reporting that "this represents the first successful attempt by the Army at analyzing its total tactical weather support requirements for the short (present to 1976) and mid (1977-1982) time frames."[15] In a letter of 12 December 1975, TRADOC directed CACDA to convene a working group to prepare a Master Plan for the Satisfaction of Army Meteorological Support Requirements--MAP/SAMSR. CACDA was to exercise overall management of MAP/SAMSR, while USAICS had "proponency" responsibility.[16] The object of MAP/SAMSR was to implement the TESS study recommendations.

A joint working group on MAP/SAMSR met at Fort Huachuca on 22-23 January 1976 and prepared a draft plan. It was approved by USAICS on 11 March 1976 and forwarded to CACDA who, fifteen days later, sent it to appropriate Army agencies and schools and AWS for comment.[17] It would then go to the Department of the Army and the Air Staff for approval as a joint plan.

In a letter to the 5th Weather Wing of 8 April 1976, the 16th Weather Squadron recommended that AWS approve the MAP/SAMSR plan. Continuing, the squadron noted that,[18]

> we welcome the increased interest in Army weather support from AWS. The need for both intermediate and long-range requirements are recognized but a note of caution is needed. For too long, the OWT [Organic Weather Team] has not had the equipment to perform its mission nor all the support or understanding from higher headquarters necessary to correct these deficiencies. On the other side of the coin, many people in Army weather support fought against centralized support. Happily, we are seeing changes for the better in both of the latter areas. We strongly recommend primary emphasis be placed on those actions that can be taken now to help the OWT do a better job. Let's not let the intermediate and long-range requirements overshadow taking what is available now and using it to do a better job.

The squadron further recommended that AWS place emphasis on immediately securing a DMSP weather satellite readout capability for the deployed forecast unit or Tactical Weather System, followed shortly thereafter by a readout at the corps; continue emphasis to get AFGWC into exercise support; use more frequently the joint Army-AWS working group on Army weather support; and select more personnel with experience in Army weather support for key positions than AWS was then doing.

MAP/SAMSR was briefed to the CACDA deputy commander on 22 June 1976, approved and sent to TRADOC the next day. Major McDonald wrote that[19]

> the plan represents six months of intensive coordination. The tasking and milestone appendix identifies specific actions,

responsible agencies and completion dates for satisfying the TESS Study recommendations. The potential for across-the-board improvements in Army weather support resides in MAP/SAMSR. Like all studies and plans, however continued emphasis and priority must be attached to it for a realization of the objectives.

The final TESS study report, dated February 1976, was distributed by USAICS in July 1976 to Headquarters AWS and AWS field units, but it was 30 August 1977 before TRADOC distributed the final coordinating MAP/SAMSR draft it approved to major Army commands and AWS for comment. TRADOC anticipated having all of the comments in by mid-October 1977, and submitting the final MAP/SAMSR draft to the Department of the Army and the Air Staff for joint approval by November 1977.

Of course TESS and MAP/SAMSR contained no surprises for Headquarters AWS because AWS personnel played important roles in shaping their contents. The staff weather officers to USAICS, CACDA, and TRADOC were deeply involved, and Major Carl H. Chesley, perhaps *the* expert on Army weather support on the AWS staff between 1975 and 1978,* made several trips to Fort Huachuca and elsewhere to help draft the documents and represent AWS' interests.

The final TESS study report of early 1976 was essentially identical to the August 1974 draft version covered above. With some changes in the wording, its thirteen conclusions and thirteen recommendations were basically the same--except that reference to the formation or designation of a single meteorological organization responsible for all weather support to the Army was deleted; and where reference was made to developing an automatic weather data processing capability, software (computer programs) was specified, as opposed to hardware (computers), and they would address mesoscale meteorology only.[20] Summarized, the TESS study represented one inescapable truth: weather support to the Army was unsatisfactory.

TRADOC's MAP/SAMSR draft set forth specific tasks, guidance, and milestones for Army and Air Force organizations to correct the inadequacies in weather support to the Army identified by the TESS Study. "Non-implementation or only partial implementation of this plan could have a detrimental impact on tactical meteorological support to the US Army," read MAP/SAMSR, emphasizing that it could not be fully implemented without proper funding and resources, and without continuous coordination and dialogue between the Army and the Air Force. Conversion to automated systems for collecting, processing, and disseminating meteorological information was necessary for the Army to meet its tactical meteorological support responsibilities, MAP/SAMSR read, but it cautioned that, while the incorporation of weather into Army decision making had to expand, austere budgets dictated husbandry of men and materiel. Approval of MAP/SAMSR by the Air Staff and the Department of the Army would constitute an order to Air Force and Army organizations involved to accomplish the plan's tasks, according to the plan's provisions. It would also constitute authority to establish a formal Army-Air Force joint working group on MAP/SAMSR,** co-chaired by a representative from CACDA and AWS, whose

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*Maj Chesley had formerly served as the staff weather officer to the 82d Airborne Division.

**Which would have supplanted the unchartered joint Army-Air Force working group on Army weather support then in existence.

charter would be to make sure the assigned tasks were completed.[21]

Having obtained an extension from TRADOC, AWS' comments on TRADOC's MAP/SAMSR draft were posted to MAC on 15 November 1977. In effect, AWS disapproved it by disarming it. AWS wanted to change TRADOC's draft by deleting specific reference to tasks and milestones, and deleting reference to Army and Air Staff approval constituting authority for getting on with the job of correcting inadequacies in weather support to the Army identified in the TESS study. AWS proposed forming a joint Army-Air Force working group comprised of general officers from TRADOC, FORSCOM, DARCOM, MAC, AFSC, and AFCS, to review and recommend policy, and coordinate and implement actions in the area of weather support to the Army.[22] TRADOC's draft was a plan of action for who should do what, when, which, if implemented, would have carried teeth. AWS' suggestions watered it down considerably.

While TRADOC was ready to act, AWS was not because, insofar as it was concerned, the TESS study and MAP/SAMSR were overtaken by events. In late 1977, as discussed below, while reviewing TRADOC's proposed rewrite of the joint regulation, the AWS commander, Brigadier General Rowe, directed that, in order to focus the attention of Army leaders on the problems associated with Army weather support, AWS propose chopping off its direct support at the corps level.

Aware of Brigadier General Rowe's position, MAC, in its reply to TRADOC of 20 January 1978, declined to forward AWS' proposed rewrite of MAP/SAMSR. MAC's position was that MAP/SAMSR should not be a joint Army-Air Force document. "Our [AWS'] charter is to provide weather support," MAC responded, and since MAP/SAMSR was a comprehensive source document for the Army's weather support requirements, it would be "inappropriate for the Air Force to become explicitly involved in stating support requirements."[23] MAC suggested that TRADOC forward the requirements in MAP/SAMSR to the Department of the Army for validation, after which the Army and the Air Staff could settle among themselves how best to satisfy them.

TRADOC then recommended to the Department of the Army that MAP/SAMSR be an Army plan only, not a joint document. In its letter of 23 January 1978, it also recommended that the Air Staff and the Department of the Army sanction a joint Army-Air Force committee on weather empowered to ensure that the Army's tactical weather support requirements were met.[24]

Although TESS and MAP/SAMSR were overtaken by events because of Brigadier General Rowe's stance, some of the TESS study recommendations had already been acted upon. Logistical support for weather teams was being switched from Signal to Intelligence TOEs, and increased emphasis had been placed on educating Army officers on the impact of weather and weather support on tactical operations. To educate AWS personnel on the Army mission and organization, the first cadre of eight AWS officers attended the allied officer preparatory course at the Army's Command and General Staff College at Fort Leavenworth from 28 July through 6 August 1976.[25] Yet Rowe's dramatic proposal to limit direct AWS support to the corps level and above spiked TRADOC's efforts to revise the joint regulation and manual to reflect up-to-date doctrine for tendering weather support to the Army.

Tac Requirements Conference, 1977

Another action taken by TRADOC to address the TESS study recommendations was to convene a conference of Army tactical commanders and have them more specifically define their weather support requirements.[26] They would also address such problems as tactical weather communications, automation, operational weather support forward of division, and Army and Air Force research and development responsibilities for meteorological equipment. The conference was hosted by CACDA at Fort Leavenworth on 15-through-17 August 1977.

In his opening remarks to the conference, Major General Glenn K. Otis,* the CACDA deputy commander, made a strong pitch for the attendees to develop a firm list of Army weather support requirements, consider all conventional means of communications to support them, and only then look at possible automation requirements. He was deeply concerned with the proliferation of systems competing for automation, and he insisted they all be "scrubbed down" to determine what, if any, data should be automated.[27]

Split into work groups, the conferees developed a statement of weather impacts in "Army decisionmaker's terms" for thirteen operational areas. A prioritized list of specific weather elements was then proposed for each area and by the echelon at which it was required. Weather observing and forecasting deficiencies were then summarized. It was agreed that CACDA would work with USAICS in "finalizing" the requirements by a "strawman" circulated through each of the TRADOC schools and centers and selected combat users, accompanied by guidance on stating temporal, spatial, and accuracy needs for each weather element or product. Once completed and approved, the Army's list of requirements would be used as a baseline for automation and communications needs, for developing and revising Army weather support doctrine, and for updating the TESS study and MAP/SAMSR requirements.[28]

Once the Army's weather support requirements were listed, the conferees discussed, and made recommendations to resolve, recurring deficiencies in tactical weather communications. In addition, a separate joint working group on communications was arranged by TRADOC to resolve problems in that area. Further development of any weather automation concept was deferred until the Army's weather support requirements could be "finalized" and weather data collection and dissemination plans developed by conventional communications means. Then, if the volume of data to be analyzed and processed to support the overall Intelligence effort needed it, a concept for automation of selected weather elements or tailored products would be considered.[29]

The Army's "strawman" was mailed on 25 November 1977 to various organizations whose efforts to further delineate the Army's weather support requirements were to be back at CACDA by mid-January 1978.[30] The joint Army-Air Force working group on tactical weather communications met at TRADOC on 15-16 November 1977. Once again the Signal School at Fort Gordon declined to attend, electing instead to have a Signal officer at TRADOC represent them. Lieutenant Colonel Darrell T. Holland, the staff weather officer to CACDA, reported that the interface problem between Army and Air Force teletype machines

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*In November 1977, Maj Gen Otis was selected to command the 1st Armored Division in Germany.

(operating at 60 words per minute versus 100) might be resolved with the Army's purchase in about a year of the AN/UGC-74 (XV) teletype, but that no short-term solution to the facsimile problems was in sight.[31]

By March 1978, all of the Army organizations--except USAREUR, as reported below--had responded to CACDA. In May, Lieutenant Colonel Holland visited USAICS to help synthesize the Army's tactical weather support requirements. Due to the shotgun approach used by several organizations, the weeding-out process was slow. In late August the requirements package was returned to CACDA who, after further review, sent it on to TRADOC on 25 October 1978. It contained a matrix of weather elements versus the detailed requirements of each Army customer.[32] By early 1979, TRADOC had relayed the package of Army requirements to the Department of the Army which, in turn, passed them to the Air Staff for information. After over three decades of volleying, the ball was back once again in the Air Force court.

Meanwhile, as a follow-on to the requirements package, CACDA directed USAICS to develop a concept for weather support to tactical Army forces, including observations, communications, and the nature of weather support products to be furnished each echelon from the field army downward.

USAREUR

In November 1977, Lieutenant Colonel Swayne, the Army liaison officer to AWS, accompanied Brigadier General Rowe on a command visit to Europe. In a report to the Department of the Army summarizing the trip, Swayne concluded that USAREUR's tactical weather requirements were not being satisfactorily met by AWS, and that there was no interoperability between the various military and civilian meteorological services supporting assets under NATO's control. During a meeting with General Blanchard on the fourteenth, Rowe told the USAREUR commander in chief that one reason AWS fell short was because USAREUR's tactical weather support requirements were imprecise. Blanchard immediately directed his deputy for Intelligence to develop a comprehensive statement of USAREUR's requirements.[33]

By March 1978, with the 7th Weather Squadron's help, USAREUR had come up with a tentative list of requirements and, typically, AWS sent it back, averring that the accuracy standards USAREUR proposed were too "stringent." USAREUR and the squadron had tentatively identified 50 weather or environmental elements (such as cloud ceiling and sky cover, snow depth, and "seeability") and 27 environmental products (forecasts, advisories, warnings, observations, studies, etc.) impacting Army operations in Europe. Its major subordinate commands were instructed to use them as a guide to provide quantitative data to satisy both General Blanchard's wishes and CACDA's effort above. USAREUR gave AWS a crack at the tentative requirements so that it could provide short-notice comment on the final version. AWS concluded that it could satisfactorily observe and forecast 40 percent of the weather elements USAREUR identified; forecasting and observation accuracy improvement was needed in 37 percent of the weather elements; and of the environmental products AWS furnished USAREUR, 43 percent did not meet USAREUR's requirement for accuracy. However, AWS believed that many of the required accuracies were too stringent, and it recommended that USAREUR and the 7th Weather Squadron re-evaluate the accuracies to ensure there was a real need for them. AWS also recommended that USAREUR prioritize the weather elements and products based on the environment's effects on specific tactics and operations. Afterwards, AWS would calculate the resources and development effort it would take to meet the shortfalls USAREUR identified.[34]

Lieutenant Colonel Swayne went back to Europe in September 1978 with Brigadier General Rowe's successor as AWS commander, Colonel Kaehn. The Army liaison officer found that weather support to USAREUR units, and the Army's utilization of weather data, had improved over the interval, due mainly to efforts by the 7th Weather Squadron and 2d Weather Wing to ameliorate the problems, and the personal emphasis General Blanchard focused upon their resolution. Two areas that continued to bar USAREUR from receiving and utilizing the full potential of weather support available from AWS were the joint regulation (because of Rowe's counter-proposal to the Army's suggested rewrite, addressed in the following chapter, the 1970 version remained in effect, complete with what Swayne believed was a vague delineation of responsibilities), and inadequate and insufficient tactical weather communications circuitry and equipment. A third handicap was the absence of a precise compilation of USAREUR's tactical weather support requirements, and during a courtesy call on the USAREUR commander in chief, Kaehn and Swayne were told by Blanchard that every effort was being made to complete that project.[35]

In February 1979, through Lieutenant Colonel Swayne, USAREUR provided AWS an advance copy of the final tabulation of its tactical weather support requirements. Swayne wrote that, together with the requirements package the Army had just passed to the Air Staff, they provided "a definitive response to a HQ AWS and HQ MAC contention that Army complaints of unsatisfactory tactical weather support is due in part to the Army's failure to explicitly state the products and resolution needed to satisfy Army tactical requirements." [36] Two months later, in mid-April 1979, the Army formally announced General Blanchard's intention to retire that summer.[37] Swayne did too, meaning that the principal players in the two-year tete-a-tete over USAREUR's weather support requirements were replaced by a new cast with different persuasions, personalities, purposes, and priorities.

National Guard and Reserve

Like the weather support requirements of active duty Army units, those of the Army National Guard and Army Reserve spiraled in the 1970s under the Defense Department's "total force" policy of relying more heavily on reserve components. It put AWS in a quandary because, while such support was implied, it was not specifically addressed in either the joint regulation or manual, and AWS lacked the necessary manpower. However, at the 5th Weather Wing's urging, as an interim measure until the joint directives were revised, AWS, in a letter of 16 January 1975, issued a policy directing field units to provide support to Army reserve components, when it was asked for, so long as it could be accomplished within the manpower levels then authorized. AWS suggested that maximum use be made of Air National Guard and Air Force Reserve forces to meet such requirements.[38]

In October 1975, the MAC Inspector General wrote a finding challenging AWS' policy, recommending that specific AWS units be tasked for the support, the same as for Air Force Reserve and Air National Guard units. AWS' position was that it had no charter to provide such support and, in January 1976, it asked MAC to seek an Air Staff ruling on the issue.[39] MAC sought a position on both direct and remote AWS support, adding that "it should be recognized that AWS lacks resources for direct support to ARC [Army Reserve Components] today, and further reductions will eliminate or greatly reduce their capability for remote services."[40] It was a reference to General Carlton's mandate to Brigadier General Rowe the previous month that AWS trim itself of about 1,900 manpower spaces (some thirty-two percent of the total manpower AWS was then authorized)--the so-called "400"-space-reduction exercise.[41]

The Air Staff's position, as set forth in a letter from Colonel Cummins (AF/PRW) to the Department of the Army on 9 April 1976 (copies of which were sent to MAC and AWS), was that where feasible, some services were provided by AWS units to Army reserve forces, but that "there is no precedent for deploying USAF weather resources to support Army reserve forces in a peacetime garrison situation."[42]

In May 1976--based on visits to Army National Guard units between July 1975 and April 1976 by a team under Lieutenant Colonel Duane H. Matters, formerly of AWS--the Air Force Inspector General reported to General Carlton that AWS support was "passive" and unsatisfactory. The MAC commander then wrote Brigadier General Rowe his belief "that we can do better without asking for more people," and to "get with it and brief me how!" Rowe agreed that AWS could do more without additional manpower, and promised to do what he could to get an Air Staff decision regarding the limits of AWS' jurisdiction in the matter. "Put in squarely to Air Force for mission tasking," Carlton ordered.[43]

Colonel Cummins responded in July 1976 to the Air Force Inspector General finding, advising that the Air Staff was still reviewing the question of weather support to Army reserve forces, but that "fiscal limitations will normally preclude direct service (on base, face-to-face) when the unit is not on an active base," just as was the case with Air Force reserve units.[44] The next month, August 1976, following an inspection of the 203d Weather Flight (Air National Guard), the MAC Inspector General once more admonished AWS for a lack of policy guidance to its field units on the matter. AWS' reply was that it was awaiting a policy declaration from the Air Staff.

It came on 24 September 1976, when Colonel Cummins informed MAC and AWS that AWS' basic mission regulation would be revised to specify that the Air Force--AWS--was responsible for weather support to Army reserve forces. For the interim, MAC and AWS were directed to determine the magnitude of the job. The Air Staff was to be informed if the requirements outstripped available AWS manpower, keeping in mind that any thoughts of increasing AWS' population should be evaluated against the wartime needs of both active duty and reserve forces. As 1976 closed, AWS' preliminary look at the job indicated that it would require quite a bit of additional manpower to satisfy, but it believed it could not do much until the Army and the Air Staff straightened out some of the basic directives.[45]

After several informal discussions with MAC and Air Staff representatives, AWS agreed in late 1976 that a conference should be convened at AF/PRW to help AWS assess the Army reserve support requirements.[46] The conference was held on 8 February 1977 and the conferees, including agents from the Army, agreed that Army reserve requirements were identical to those of the active duty force; that AWS was responsible for arranging or providing the needed support--with emphasis on arranging support since face-to-face service would not be the rule; and that support would be limited to reserve flying units (at approximately 129 bases). Discussions revealed that Army reserve flying units preferred flight clearance briefings from AWS forecasters, but would accept support from Federal Aviation Administration (FAA) flight service stations. Finally, it was agreed that FORSCOM, with AWS' assistance, would survey the Army reserve flying units to assess the adequacy of current support and, based on the results, AWS would develop a plan for satisfying those requirements and forward it to MAC and AF/PRW for review.[47]

Between December 1976 and March 1977, AWS used a reserve weather officer to provide staff weather officer support to FORSCOM's Fifth Army (which, together with FORSCOM's Sixth Army, was responsible for the training and readiness of all Army Reserve and Army National Guard units) as a test and concluded that it was a workable idea. In March 1977 AWS developed strawman tasking of specific AWS units to provide liaison with known Army reserve units. In April the 5th Weather Wing's mission regulation (MAC Regulation 23-45) was altered to make provision for weather support to Army reserve units. The FORSCOM survey was received in late August 1977, providing AWS with its first comprehensive look at Army reserve flying unit requirements. Many shortcomings and unfulfilled needs were identified and AWS decided that, in consonance with the review ordered by Brigadier General Rowe on AWS' Army weather support policy above, an AWS policy on Army reserve component (Army Reserve and Army National Guard) support was also needed.[48]

On 10 November 1977, AWS sent its proposed policy to the weather wings for comments.[49] Early the following month, the AWS staff made policy recommendations through the AWS Council* to Brigadier General Rowe who approved them on 5 January 1978.[50] The AWS policy was forwarded to MAC the same day.[51]

AWS' policy--which was predicated on the 1970 version of the joint regulation, and *not* upon the change addressed below, proposed by Brigadier General Rowe, to chop off all direct AWS support at the corps--was that when Army reserve units were in training, AWS' primary support role was to assist them with readiness for war. It would provide or arrange support for reserve aviation facilities and the headquarters of armored cavalry regiments, separate brigades, divisions, and EAD corps. Air Force Reserve weather personnel would be used as much as possible in tendering the support, and existing facilities--including FAA flight service stations--were to be used wherever possible. Army reserve control tower personnel could provide weather service if within their capabilities, and when operational activities permitted. AWS would provide support when it was infeasible to arrange for it, or for Army reserve personnel to provide it. Logistical support was to be provided by the Army reserve to Air Force weather units on a common service basis equitable with that furnished Army reserve units of comparable size and activity. On a common service basis also, the Air Force would procure, install, and operate all fixed and tactical weather equipment, and maintain it at those sites where AWS had a support responsibility. When required under the joint regulation, and when the necessary Modified

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*As a lieutenant colonel in the plans shop of HQ AWS, Berry Rowe was the father of the modern AWS Council, reincarnated in Nov67 with a composition and charter--a body to review and recommend policy to the AWS commander--identical to the defunct AWS Policy Board established in August 1949. See Fuller, *Air Weather Service, 1937-1977: An Illustrated Chronology*, Jul77, pp. 11-12.

Tables of Organization and Equipment (MTOEs) were provided, AWS would furnish weather teams for mobilized divisions, separate brigades, and armored cavalry regiments. Where practical, the weather team would be led by the reserve weather officer designated to assist with staff support to the Army reserve unit. AWS estimated it would take from twenty-three to twenty-eight additional manpower spaces to implement its policy.

AWS' policy was put to the test by a formal SOR (Statement of Requirements) for direct observing and forecasting support to Muir Army Airfield at Fort Indiantown Gap, Pennsylvania. In response to the July 1977 SOR, MAC conceded that direct support was needed, but informed the Army that AWS lacked the necessary manpower. In March 1978, MAC forwarded to the Department of the Army and FORSCOM a concept calling for direct observing support at Muir, and remote forecasting service from McGuire AFB, New Jersey. In a personal message to Major General Collens, the former AWS commander then serving as the MAC chief of staff, Major General Charles M. Hall, the acting FORSCOM chief of staff, took exception to the concept. Pilots at Muir were receiving their weather briefings by telephone from both Fort Meade, Maryland, and the Federal Aviation Administration's flight service station at nearby Harrisburg, Pennsylvania. Neither method was acceptable, Hall wired in early May 1978 in asking Collens to personally review the situation. After summoning Brigadier General Rowe for consultation, Collens agreed with Hall that weather service at Muir needed improvement. Unfortunately, MAC and AWS did not have the manpower to provide Muir direct forecasting support. So, in line with AWS' policy, remote service from McGuire would have to suffice--which, Collens assured Hall, was consistent with weather service extended to Air Force Reserve and Air Narional Guard units, and would work if the Army ischarged its responsibility under the joint regulation to take care of the necessary communications support. In reply, Hall noted that he fully appreciated the manpower shortage in AWS and agreed to give the remote forecasting concept a try.[52] In mid-August 1978, AWS assigned three observers to Muir and an additional forecaster at McGuire--a precedent setting event, not only because the personnel assigned were active duty Air Force, but because, rather than directing AWS to take them from "lower priority" resources, the Air Staff authorized the extra manpower spaces.[53] By mid-October 1978 the Army airfield commander at Muir was well pleased with the observing support AWS was providing, but the forecast briefing service was unsatisfactory because communications were poor.[54]

Manpower problems appeared to be compounded further by an Air Staff decision in mid-1978 to reduce Air Force weather reserve forces. In 1977, during its annual review of manpower needed to fulfill wartime requirements, the Air Staff altered the ground rules to such a degree that there were insufficient requirements to justify the number of manpower spaces authorized to the 100-series Air National Guard weather flights--those weather flights dedicated to supporting Air Force reserve units, manned by both Air National Guard and Air Force Reserve Individual Mobilization Augmentees (IMAs). The Air Staff decided to cut 63 IMA weather authorizations (approximately 37 percent of the total) and 224 of the 596 Air National Guard manpower spaces authorized the weather flight program. Representatives from the National Guard Bureau, MAC, and AWS met in October 1978 to ascertain how to distribute the cuts, and how he remaining weather flights would be organized and aligned. It was determined that Air National Guard weather flights would be aligned primarily to provide support to Army reserve units. AWS informally agreed to convert 18 of the 31, 100-series Air National Guard weather flights to Army support aligned with separate brigades and armored cavalry regiments of the Army National Guard and Army Reserve.[55]

Ready for a Pibal run for support of the Army in 1968 are SSgt Earl E. Craig and A/2C Ted L. White from the 207th Weather Flight, Stout Field, IN. (USAF Photo)

But the eight existing 200-series Air National Guard weather flights, manned by 128 officers and enlisted men, were in extremely poor shape. Visits by MAC Inspector General teams to selected flights in 1976-77 resulted in several unsatisfactory ratings. Manning levels were generally up to established standards, but the weather people assigned were not "in bed" with the Army reserve units they supported, and the Army was not providing them field gear. As a conseq"^nce, the MAC Inspector General acceded to AWS' request in early 19/8 for a moratorium through that fall on inspections of 200-series weather flights to give them time to bring themselves up to speed operationally.[56]

IDA Study, 1977

In early January 1977, officials from the Institute for Defense Analysis (IDA) visited TRADOC to discuss a two-phased study they were commissioned to conduct by the Defense Department's DDR&E (Defense Development Research and Engineering) on the value of weather support to the Army. Phase one would evaluate the utility of improvements in mesoscale forecasting to Army combat forces, and the second phase would identify improvements offering potentially significant operational benefits to the Army. IDA had until June 1977 to design the study, and another year to complete it.[57]

Army organizations IDA representatives visited included CACDA, the infantry school at Fort Benning, Georgia, and the field artillery school at Fort Sill. Among other questions, they wanted to know what decision would be made or action taken if the decision maker could be assured of a given weather forecasting accuracy. At the infantry school they were advised that improved accuracies would have limited tactical application at battalion and company level, but would help a great deal at the division and corps levels if accurate forecasts could be provided three-to-five days in advance.[58] The artillery school's position was that few, if any, actions would be taken based upon any forecast with less than about a ninety-percent reliability. If a forecast for one-half mile visibility in fog were made for the following morning, for instance, no action would be taken to relocate weapon systems or change the mix of electro-optical systems. The decision maker wanted to know that visibility would be impaired, but would take no action other than to anticipate that he would be unable to acquire targets as soon as he would if visibility was unrestricted.[59]

In the spring of 1978 TRADOC received a preliminary draft of the IDA study, dated 13 March 1978, and entitled "Assessment of the Operational Utility of Mesoscale Weather Forecasting Improvements for Army Forces." It concluded that estimates of how mesoscale forecasting accuracy could be improved were extremely optimistic. TRADOC took exception to many of its conclusions because the IDA consultants, not being meteorologists, had asked poor questions and had incorrectly interpreted the data so gathered. Nevertheless, IDA planned to continue with the second phase of its study in which it would determine the Army's requirements for combat weather information--low level winds and stability for chemical operations, for example, or temperature, density, and winds for artillery fire. Its evident goal was to define contemporary capabilities in mesoscale meteorology; estimate future capabilities in that area; quantify the value and utility of mesoscale observations and forecasts on the battlefield; and determine if research and development money should be invested for improvements in mesoscale meteorology.[60]

Support To NATO Army Forces

At the request of the Federal Republic of Germany on 30 April 1976, addressing the subject of weather service interoperability in support of NATO (North Atlantic Treaty Organization) tactical army forces in Europe, the 5th Weather Wing, together with Lieutenant Colonels Macy and McDonald (the staff weather officers, respectively, to USAICS and CACDA), worked jointly with TRADOC to define the anticipated weather support requirements in Europe through 1985. TRADOC's reply of 3 June 1976 was significant in that it formally addressed weather support concepts above corps level for the first time since the EAC decision discussed earlier herein.[61]

Subsequent to his command visit to Europe in November 1977, Brigadier General Rowe directed his staff to develop an AWS NATO support policy, which the AWS commander approved in July 1978. AWS declared that it would provide weather support to Air Force and Army units under NATO command and control, including separate brigades, armored cavalry regiments, divisions, and corps. The Air Force was to encourage NATO to provide or arrange the best possible weather support to its command and control elements with jurisdiction over Air Force and Army resources; consider NATO interoperability while developing weather plans, programs, and systems; and, through AWS, use standard NATO codes, formats, and procedures, etc., to present weather information to participants in NATO operations. AWS advocated that forecasts from a single source be used to support NATO operations and, to the extent possible, it vowed to pattern its peacetime weather support to NATO designated forces after that planned during wartime.[62]

The AWS Position

Despite the fact that the Army had repeatedly responded, AWS' traditional position through the years from World War II onward was that the Army had failed to be specific about its requirements for weather support. The litany from AWS was heard in the Korean War and after. Once the Army forwarded a comprehensive set of requirements--in 1956 and again in 1958 and 1959--the Air Staff would not cough up the manpower to satisfy them. The Air Staff's position in the late 1950s was to balance Army requirements with Air Force assets and, if overall Air Force interests were jeopardized, suggest the Army provide the manpower or identify lower-priority AWS resources that could be shifted.

The Army's specific weather support requirements could be found in several sources. They were listed in the joint manual and the joint regulation--both the 1962 and 1970 versions. They could be found in TOEs and MTOEs. They were available in several official Army studies such as MET-70, MET-75, and TESS. Even the Air Force's multi-volume Weather 85 mission analysis of AWS published in 1973 contained a section addressing the Army's requirements out to 1985.* And of course the requirements were manifested on an individual unit basis in the formal SORs insisted upon by the Air Force and AWS. Yet when the Army landed in force in Vietnam in the mid-1960s, the Air Force and AWS could not keep pace with their SORs. And after that war, while AWS' manpower pool was being bled dry by a succession of drawdowns, Army requirements state-side and in Europe mushroomed, and the Air Force and AWS had to reduce 14-man corps and division weather teams back to 4- or 6-man "cadre" teams while in garrison.

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*See Section I, Vol III, *Air Force and Army Requirements for Weather Support, 1972-1985*, of *Mission Analysis On Air Force Weather Mission - 1985*, (L. G. Hanscom Fld, MA: Electronic Systems Div, AFSC, Jan73), (S). Info used (U).

Therefore, despite the fact that Army authorities were generall unaware of what AWS support was available or how to use it (a deficiency AWS' staff weather officers with Army units were responsible for overcoming), and notwithstanding AWS' allegation that they were too vague, the Army requirements for weather support (which were quite specific in many instances) were on record, for those truly interested in them. The problem was that they translated into more manpower and resources, which AWS did not have (unless it chose to cut support to some Air Force units), and the Air Staff would not allocate.

Brigadier General Rowe, the AWS commander from mid-1975 through 1977, harbored particularly strong views on the subject, which influenced his proposal to cut off direct AWS support at the corps level. Asked in an interview whether AWS support to the Army was "second class" or "token," as some officials in AWS had characterized it, Rowe confessed that it was a "little on the marginal side," even "potentially unsatisfactory," but that the Army received a "fair share" of AWS' attention and resources "consistent with known [Army] requirements." "The Army has not asked for, in my view, the support they really ought to have," he said. Asked why the Army was compelled to submit formal SORs when it was not required of Air Force units for routine support, the general replied that it was not true. The Air Force used a process similar to the SORs. The problem with SORs, he continued, was that they were generated--in concert with the staff Intelligence officer--by AWS staff weather officers. It raised questions about credibility by the Air Staff, and led to Air Force-proposed solutions to Army problems because the Army had more importan things to worry about. When MET-70, MET-75, and TESS were recalled in response to his premise that the Army was not adequately stating specific requirements, Rowe countered by saying that the drawback with those studies was that they were done more in an academic environment than in a field command; they were done by support and staff officers--including AWS' staff weather officers--rather than by the users, the Army decision makers. "The Army people who are going to have to fight the battles need to get involved in what they require from Air Weather Service," the general responded. When reminded that the Fort Leavenworth tactical requirements conference of August 1977 cited requirements identical to those spelled out in TESS, Rowe replied that the test of their validity was whether or not the Army was willing to obligate assets to fulfill them. Questioned why the Army should have to commit resources when it was AWS' mission to furnish the support, Rowe said the joint regulation specified that forward of division, "the Army would do things meteorological for itself," but that the Army had "totally abrogated that agreed position." In fact, the joint regulation specified that AWS would furnish forecasting support forward of division, and that the Army would provide all communications below the field army level and observations forward of division--although it contained loopholes engineered with Rowe's help, whereby the Air Force could furnish observations and communications below division level.[63] However, notwithstanding the fact that the Army had done so in Vietnam with its Special Forces teams, Rowe was correct in pointing out that the Army had not routinely furnished surface observations forward of division, not only for its own use but for use by AWS to support it. Until the Army committed resources to perform such tasks, it was Rowe's opinion that the Army considered studies like TESS "documentary exposés and not requirements." Committing its own resources to meet them, Rowe believed, would be defacto recognition by the Army that the requirements set forth in TESS were indeed valid instead of "nice to haves."[64]

FALOP

Brigadier General Rowe believed that the Army's involvement in the Forward Area Limited Observation Program (FALOP) was a step in the direction of the Army's recognizing its responsibilities under the joint regulation by committing resources to meet its own requirements.

Developed by Colonel Walter M. Dale, commander of the 2d Weather Wing's 7th Weather Squadron, and staff weather officer to USAREUR, and tested in the 1st Armored Division during several field exercises between November 1975 and March 1976, FALOP was designed to increase substantially the number of weather observations taken forward of division. Intelligence personnel in brigades and battalions of infantry and armored divisions, and armored cavalry regiments, were trained by 7th Weather Squadron people to take limited weather observations using forester or belt weather kits. Trouble was encountered during the tests in getting the observations back to division because there were no dedicated weather communications facilities. Nevertheless, it increased surface observing sites from 4 to 17-to-20 per division, and from 4 to 8-to-12 per armored cavalry regiment. While informing the Department of the Army about FALOP, and the fact that it would be implemented throughout USAREUR, the USAREUR chief of staff called it "a step forward in solving a long standing deficiency."[65]

Brigadier General Rowe agreed that FALOP was a praiseworthy innovation and a "significant milestone in Army weather support"--as he described it to the USAREUR commander in chief.[66] After directing his people to extend the FALOP concept to other Army organizations, the AWS commander asked the Air Staff (AF/PRW) in late January 1977 to inform Department of the Army authorities of AWS' support, and solicit their aid in widening its use.[67]

In line with AWS' policy, TRADOC was urged in 1978 by its staff weather officer to direct USAICS to formally implement FALOP throughout the Army.[68] Early that fall, TRADOC asked USAICS to determine if there was a need to do so.[69]

Meanwhile, FALOP was implemented by other Army units, including the Eighth Army in Korea, where it became fully operational in May 1978.[70] Efforts had been hampered by a shortage of belt weather kits within AWS, their unavailability through Army supply channels and, in the case of the Reforger 77 exercise in Europe, because the operations and intelligence communications net was not always free of traffic to relay the observations back to division.[71] FALOP was a good concept, but would not benefit either AWS or the Army unless a way was found to ensure that the observations got from the forward areas to the people who could make use of them. Furthermore, FALOP reportedly did not provide observations of a quality good enough to benefit AFGWC and, indeed, AWS had to determine whether or not there was really a need to relay them back to AFGWC.[72]

CHAPTER 9 - CONCEPTS, POLICY, AND DOCTRINE

Air Force

Basic Air Force and Army policy governing the provision of weather support to the Army was set forth in the joint regulation and joint manual addressed below. They reflected official Air Force policy. Yet the key policy issue for the Air Force was whether or not AWS should support the Army and, if so, to what degree--and no discussion of it ever found its way into the directives, although it was every bit as binding for AWS.

While high-level Air Force authorities in the late 1950s opposed continuation of AWS support to the Army, as addressed above, such beliefs evidently were not aired during the 1960s--probably because the war in Vietnam somewhat eased the pressure on Air Force resources. Army weather support requirements equated to Air Force resources, and while the Air Staff recognized the desirability of AWS supporting the Army, the Air Staff would not allocate resources for Army support if Air Force interests were jeopardized. If they were, the Army would be accorded the option of transferring Army manpower to meet its requirements, or of identifying lower-priority AWS resources already allocated for Army support which could be shifted.

With their resources undergoing cutbacks in the early 1970s, top Air Force officers once more questioned why AWS supported the Army. The question was posed by the Air Force vice chief of staff in late 1971, and by the Air Force chief of staff some eighteen months later. Although not voiced to those two particular officers, one reply by an Air Staff official (AF/PRW), as relayed by the AWS commander, General Best, was rather succinct, if academic: "for the same reason that the Air Force provides close-air [even airlift] support to the Army."[1] It was a matter of roles and missions. Air Force officials continually had to discomfit efforts by Army counterparts who would have liked an "organic" close air support or tactical airlift capability--and who could say for certain they would not relish an "organic" Army Weather Service. Hang a few more gun mounts and rocket pods on their helicopters, give them back the C-7s the Air Force took in Vietnam, and organize the 800-plus weathermen they had and the Army would be in business. If the Air Force abdicated its responsibilities under joint doctrine the Army did not care. But both branches would suffer because of it.

As the 1970s dawned, the Air Staff (AF/PRW) was indifferent toward the formation of an Army Weather Service. To begin with, informal contacts with the Army unearthed a disposition to let AWS assume the entire Army weather support mission, as discussed below. Moreover, reasonably secure in the belief that the Army could not afford an Army Weather Service in the post-Vietnam era of shrinking defense budgets, or that budget beagles from the legislative and executive branches would not support such duplicative efforts, the Air Staff could be niggardly in allocating Air Force assets to Army weather support requirements. The fiscal facts of life dictated the Army and Air Force positions in the affair.

The Air Force did not hold a resource purse with no bottom. Air Force assets were finite. It looked askance at Army efforts to tap its till. As Brigadier General Best emphatically emphasized, while mentioning the Air Staff's resistance to devoting more Air Force assets to Army weather support, "*the cupboard is bare.*"[2] The three-star general on the Air Staff to whom AF/PRW answered told Best personally that he "wanted Air Weather Service support of the Army no worse, nor no better, than that to the Air Force,"[3] At one point the Air Staff wanted the Army to reimburse it for services rendered--which the Army adroitly sidestepped by reminding the Air Force of the roles-and-missions agreements under the National Security Act of 1947, and that Defense Department directives excluded reimbursement by one branch to another for tactical support, which the Army interpreted as including all AWS support. The Air Staff looked critically at Army SORs, and asked AWS to drag its feet in helping the Army submit them.

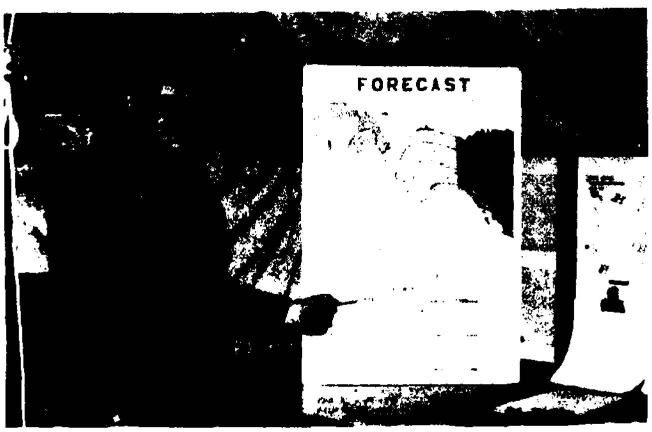
By the mid-1970s, with Brigadier General Rowe's ascendence to the AWS helm, the Air Staff's tacit position had not changed much. Colonel Cummins, who served as the Air Staff's assistant for weather (AF/PRW) from mid-1975 to mid-1978, said that during his tour no high-level general officers on the Air Staff had questioned the necessity for AWS' supporting the Army, but that guidance from his superiors inferred that the Air Force would continue to underwrite the effort only so long as the Army chipped in with some help.[4]

Brigadier General Rowe, who led AWS while Colonel Cummins was the Air Staff's assistant for weather, reported that he had received no specific guidance from the Air Staff, but that,[5]

> I can infer guidance by actions of the Air Staff in resource control. I could translate those to say: "There are only so many resources available. You do with those resources what you can. Come and ask us to do other things that require more resources." My general feeling is that had I asked for more resources the answer would have been: "no, try and re-adjust your priorities to accommodate new requirements with existing resources." As you know, we have told the Air Staff we don't have the assets to satisfy specific SORs . . . .But I think that if I had asked for guidance, I would have gotten essentially the same thing that General Best got.

Indeed, the Air Staff's cupboard was still bare in 1977 as evidenced by its response to the Army's desires for direct support in Alaska. In late 1976 the Army submitted SORs for direct observing and forecasting support at Forts Richardson and Wainwright. It was ascertained by AF/PRW (Colonel Cummins), through AWS, that it would take thirteen AWS manpower spaces, but Cummins advised the Army that AWS did not have them. In late November 1976, therefore, the Department of the Army surveyed each of its major commands, asking them to scrub down their requirements in an effort to come up with spaces for Alaska. The need for direct weather support "must be reduced to a minimum level consistent with operational and safety requirements," the Army wrote; "commanders must make every attempt to arrange for remote . . . support and to substitute remote service for direct weather service support during periods of limited flying activity."[6] In a letter to the Air Staff--Cummins--of mid-February 1977, the Army noted that by reducing requirements for direct support at Forts Knox, Leonard Wood, and Rucker it came up with about eleven AWS spaces that "should provide a nucleus for the establishment of AWS detachments at Forts Richardson and Wainwright."[7] Ten days later

AWS support to the Army in Alaska: during exercise Jack Frost 75 (Jan-Feb75), 11WS weathermen "camped out" (top photo) with soldiers of the 172d Infantry Brigade near Fort Wainwright. At right, SSgt Larry L. Johnson uses anemometers, while at bottom, Lt Col Edward Smoot briefs Army field commanders on current and forecast weather--snow, maximum temperature of -13°F, and a minimum temperature of -28°F. (USAF Photos)



Cummins passed the news to MAC and AWS.[8] AWS units were activated at Forts Richardson and Wainwright.*

Brigadier General Rowe took pains to point out that his channel to the Air Staff on policy and assets was through the MAC commander. He had not asked for, nor had he received, any guidance from MAC because he felt he had the charter, the mission statement, and the mechanism (the liaison structure with the Army, which he confessed to be delusory after he could not get the Army to act), to settle basic issues himself, with AF/PRW's help.[9]

Particularly discomforting to the AWS leadership in the 1970s was opposition evidenced by the Air Staff's assistant for weather (AF/PRW) towards AWS' data automation and centralization concepts. "When we optimize for peacetime service, keep this tenet in mind," the AWS commander, Brigadier General Collens, urged his people in mid-1974: "will it work in war--any place, any time regardless of level of conflict or degree of sophistication?"[10] Just as his predecessor at AF/PRW had, Colonel Mortimer F. Bennet had just such a tenet in mind in mid-1974 when, in the wake of the Maxwell Incident earlier that year, he recommended that further centralization of AWS' forecasting responsibilities should only be undertaken after thorough evaluation.[11] "No one I know" on the Air Staff, Bennet had cautioned the AWS leadership earlier, "is interested in a better forecast."[12] Bennet's successor at AF/PRW, Colonel William E. Cummins, ran into the same obstacles on the Air Staff while trying to sell AWS' requirements for AWDS and bigger and better computers for AFGWC. With only mixed success, the AWS leadership met with AF/PRW several times in the 1970s to sell AWS' centralization concepts because of AF/PRW's role as the Air Staff linchpin for AWS programs seeking more Air Force assets. "PRW position is that MAC/AWS has gone too far in centralizing weather production functions at AFGWC," a MAC staff officer reported following one such meeting with Cummins at AF/PRW in February 1977:[13]

> PRW holds [that] the pace of centralization has reduced the ability of forecasters to stand alone in the field and support Air Force and Army operations. Hence, centralization has cut into AF/Army combat capability. Additionally, PRW questions MAC/AWS ability to transmit AFGWC data to contingency/war area in a reliable and timely manner. Basic PRW thrust--slow down. We (MAC and AWS**) were unable to modify the PRW position.

It highlighted one of the peculiarities of the AWS "family," as Brigadier General Best liked to refer to the inbreeding in AWS. In 1967-68, as lieutenant colonels, Cummins and Rowe were blood brothers in the AWS "family," career weathermen harmoniously working their way up through the ranks--the former an officer in the field, prior to going to Vietnam to command the 5th Weather Squadron in Army support, the latter at Headquarters AWS in plans. In 1971, Cummins was the

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*Effective 1Feb77, the operating location at Fort Richardson (OL-J, Det 4, 11WS, 3WW) was upgraded to a detachment (Det 4, 11WS), and an operating location (OL-A, Det 4, 11WS) was established at Fort Wainwright. See MAC SO G-407, 24Nov76.

**Senior AWS representative at the meeting was Col Salvatore R. LeMole, the DCS for Operations, who had pulled a tour at AF/PRW just prior to mid-1974, and who became the AWS vice commander in August 1978. At the meeting also, from AF/PRW, was Col Ramon C. Wilkins, who became AWS chief of staff in December 1977.

number two man in operations at Headquarters AWS when the AWS leadership was displeased with disabling manpower cuts levied by the Air Staff under quotas Rowe helped establish while in the AF/PRW shop. On the other hand, AF/PRW was annoyed by AWS' eternal quest for bigger and better (and costly) computers, or with AWS' vacillating position on a piece of tactical meteorological gear with the exotic acronym EROWS--Expendable Remote-Operating Weather Station.* In 1975-77 Rowe was at the helm of AWS discrediting AF/PRW as he tried to sail the ship of state upstream against storm warnings from Cummins that too much centralization and automation too fast by AWS was undermining the Army's combat potential, and that AWDS could not successfully compete for Air Force money with programs like the F-15, the E-3A, and Minuteman. Various positions of responsibility had a strange way of reversing viewpoints of the Air Force's career weathermen.

AWS

AWS policy on the key problem areas in Army weather support was detailed in earlier chapters. Summarized, AWS did not believe the Army was adequately stating its requirements, or asking for what it ought to have. It opposed the formation of an Army Weather Service, but would accept the responsibility for meeting all the Army weather support requirements provided adjunct resources came with it. In line with Air Staff policy, it was dedicated to holding the line on Army weather requirements equating to more Air Force assets, even reducing them where possible. Support to divisions should be direct, but if the Army insisted on prying the weather team from the main division command post, it should be provided remotely by the weather team at corps. Doctrine in joint directives was outdated and ambiguous. Recurring drawbacks in tactical weather communications needed resolution. Tactical meteorological equipment had to be simple, rugged, and preferably not dependent on external power sources. Complete MTOE support of weather teams was a must. A direct satellite readout capability was not needed at corps level or below. Support to the Army had to be in gee with AWS' centralization and computerization concepts for the AWDS era. There was a need to educate Army officers on the value of weather support, and AWS officers on the Army's tactical concepts for winning the land battle--its primary mission.

The AWS leadership in the 1970s devoted more attention to supporting the Army than at any time since the 1950s. It was prompted by the experience in Vietnam; changes in the Army's fundamental fighting concepts; tacit recognition that AWS support to the Army was "token" and "second class," and knowledge that the Army was spotlighting that deficiency in various studies; and the realization that, while Army personnel levels shrunk, its requirements for weather support were expanding at a time when AWS' support could very well be eroded further due to Air Force and MAC-imposed cutbacks in its manning. It became a matter of policy for the AWS leadership to meet head-on the problems in supporting the Army. It resulted in improved and expanded dialogue with the Army, manifested primarily in four Army weather support conferences, and five meetings of a newly-

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*For a synopsis of EROWS--whose immediate ancestry went to 1965, but also had roots in the Army Signal Corps' SCM-19 Automatic Weather Station, developed in the late 1940s and tested in 1951--see the discussion in Chapter 4 herein.

Brig Gen Best

Brig Gen Collens

Brig Gen Aldrich

established joint working group, between 1970 and 1977, as discussed below, each attended by Army representatives--sometimes general officers. "We have come to grips with the challenge of improving our support to the U.S. Army," Brigadier General Best told one such conference in January 1971,[14]

> We recognize that Army support is a different breed of cat, in other words, there are significant differences between the functions of the normal base weather station and the . . . field army. Unfortunately, within the latter area there is considerable difference in our mode of operation. Army support should be examined to achieve a greater degree of standardization--standardization should move ahead to the degree possible. In the manpower area, austerity is the word for the future. We must scrutinize our force for potential resource savings. Some cuts will be effected in both Army and Air Force support; however, the reductions will be made with a view toward making our support to the Army as good as that provided the Air Force.

By the end of his tenure as commander, in mid-1973, General Best thought AWS was doing a good job of supporting the Army, but could do better if it had more resources. The Army appreciated the job AWS was doing for it, the AWS commander said, but its officials were still too unfamiliar with meteorological state-of-the-art to appreciate how much more AWS could be exploited.[15]

Brigadier General Best mentioned General Carlton's "wall-to-wall scrubdown" of AWS in 1973, which concluded that the entire United States Army received service from AWS approximately equivalent to that provided a major Air Force command. One MAC official reported that the Army got less service from AWS than did the Air Force "by a factor of four or five," while another said the Air Force was favored by AWS by a factor of eight-to-one.[16] In fact, the MAC commander's "scrubdown" of AWS revealed that AWS had 6,913 manpower spaces engaged in weather support (excluding its weather reconnaissance force), 1,146 of which were devoted to support of SAC, 929 (13%) to the Army, 652 to TAC, and 639 to PACAF, representing the four biggest investments in AWS manpower; AWS' total costs were $71,040,500 (salaries and O&M--Operation and Maintenance), $11 million of which was devoted to SAC, $9 million to the Army, $6.9 million to PACAF, and $6.4 million to TAC. That, despite the fact that the Army had more people and airplanes (only one Army airfield in the United States received 24-hour observing and forecasting support from AWS)* than did the Air Force--and even then the Air Force chief of staff felt it was too much, and wanted to know why AWS was supporting the Army at all.

Of the AWS commanders in the 1970s, Brigadier General Rowe, to his credit, devoted more time and energy to Army weather support than did his predecessors. The reason he was able to do so, he said, was that he had more time available because he did not have to fiddle with the burdensome and demanding weather reconnaissance mission and resources, which General Carlton got the Air Staff to give to ARRS (Aerospace Rescue and Recovery Service) in September 1975, and the weather equipment maintenance mission and resources which, at Rowe's urging, under pressure by Carlton to cut AWS further, the Air Staff transferred to AFCS in October 1977.[17] Rowe had less than half the

*By contrast, the vast majority of MAC's fourteen main operating bases in 1976, and all of SAC's, enjoyed 24-hour observing and forecasting support from AWS.

Brig Gen Kaehn being interviewed by CMSgt Q. J. Keaveny (left), during NATO field training exercise, Constant Enforcer 79.

people, and none of the five dozen airplanes, that Brigadier General Best started with in 1970. Of the 4,720 manpower spaces authorized AWS in May 1978, 802 (17 percent) were dedicated to Army support.[18]

Aside from the fact that it was part of his responsibility as the AWS commander, two other factors that heightened Brigadier General Rowe's interest was the importance he attached to weather support to Army units in combat, and the "deficiencies I've seen in the ability of our people to do the job."[19] Rowe characterized AWS support to Army under his administration as satisfactory, but that it "could be evaluated a little on the marginal side in a lot of respects," and "I think [the characterization] 'potentially unsatisfactory' is what moved me to do what little I have been able to do."[20]

Answering allegations that uncertainty existed among his field units and within the Army over who precisely within AWS was responsible for formulating and articulating policy on weather support to the Army, Brigadier General Rowe conceded that, to a degree, they were probably on the mark. Moreover, he was responsible for formulating policy. But because the Army had largely neglected its "obligation to be a player in that policy," Rowe said it resulted in unilateral AWS-Air Force policy and "Air Force solutions to Army problems."[21]

Field Unit Views

It was "intelligence" from AWS field units, as Brigadier General Rowe phrased it, that kept Headquarters AWS mindful of the fact that all was not well in the Army support game. During the Army weather support conference of January 1971, a 5th Weather Wing official mentioned the gratification his wing felt over AWS' increased attention to the matter, saying that the wing had made "significant strides" in improving AWS support to the Army and that it was the wing's responsibility that "this support is not again relegated to a second-class status."[22] A year later the 2d Weather Wing and 7th Weather Squadron commanders told a visiting officer from Brigadier General Best's staff that AWS was furnishing mere "token support" to the Army in Europe, and that AWS should support the Army fully or get out of the business.

In late 1973, Brigadier General Aldrich directed the 16th Weather Squadron commander to investigate ways to further reduce "cadre" weather team manning and, paradoxically, improve weather support to the Army. Responses from the squadron's weather teams raised both old and new issues. Special training was needed before assuming staff weather officer duties with the Army; communications support by the Army varied from good to bad; there were inconsistencies between communications equipment authorized in TOEs and that on hand; and some Army communications equipment was incompatible with Air Force equipment. A proposal to locate the staff weather officer in the Intelligence office at each Army element was almost unanimously opposed! As a result of its survey, the squadron offered suggestions to "higher headquarters" for improving AWS support of the Army. For the long term, the joint directives needed revising, and TOE authorizations had to be consistent with Army doctrine. For the short term, among other ideas, the squadron suggested that AWS officers assigned to Army support be experienced and graduates of special courses and schools; there be more crossfeed of information among people in each weather wing supporting Army elements; and that the MAC Inspector General teams concern themselves more with Army support concepts and doctrine than with routine Army airfield support.[23]

In early December 1974, Colonel Leonard E. Zapinski, the 5th Weather Wing commander,* informed the 16th Weather Squadron that his wing was going to play a more active role in managing its assets committed to Army support, and that "the bulk of the AWS concepts and doctrine for Army support, . . . with your assistance, *must* emanate/pass through this office."[24] Interestingly enough, the subject of Army weather support was not on the agenda during a conference Zapinski hosted for his subordinate commanders the same month.[25]

Six months later, as a follow-up to Colonel Zapinski's instructions, the wing proposed to its units--and answered--the question of "where are we going in Army weather support?" It reviewed the wing's "modest" but "tangible accomplishments" the past six months, and then went on to note that,[26]

> if we are to continue to "move out" with improving weather support to the Army, we must become more involved. In the future, the 5WW staff will function as the "catalyst," with the assistance of the other wings and AWS, in the coordinated staffing process required to approve doctrine and changes thereto, translating the doctrine into reliable operational

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*Before assuming command of the wing in October 1973, Zapinski headed in succession, the plans and operations staff agencies at HQ AWS, and before that had commanded the 1st Weather Group in Vietnam--whose 5th Weather Squadron supported Army units there.

> concepts, and insuring that proper monitoring and feedback channels exist between operational and doctrinal units. This function is the key to the program.

Along the lines of communicating his policy to his staff, the 5th Weather Wing, and other AWS field units, Brigadier General Rowe was asked what specific guidance he had issued. "I've basically told them," he responded, that [27]

> we don't have surplus assets; that it's difficult for us to meet new requirements. . . . Be as realistic as possible. Don't ask for nice-to-haves. . . . But if you have a hard, supportable, documentable requirement, send it in. In essence, keep the cards and letters coming in on Army weather support. . . . I think my wing commanders understand there is no lid on Army support. [However,] there are practical limits. We must act under current guidelines. . . . They also have a responsibility to solve today's problems, . . . but we have to live in today's world. . . . Now, whether we have communicated that down below the wing commander level--perhaps we've not done as good as we could.

Joint Force/Tactical Support

For the sake of keeping rein on the study's scope, most of the foregoing discussion was limited to support of the Army; but it must be understood that by no means did that support exist in a vacuum. It was inextricably tied to the reality that Army elements were generally employed as part of joint forces--unified commands comprised of Army, Air Force, Navy, and Marine Corps components--for combined operations in places like Korea, Vietnam, and Europe. Because of that fact, AWS support to Army units had to be delicately blended--in terms of men, materiel, and services--with its support to Air Force elements attached to the same joint force. When one considered the many variables involved--peacetime versus contingency or wartime, garrison versus field support, deployment of stateside Army and Air Force units overseas for assignment to, and employment by, unified commands, etc.--it was an extremely complex arrangement. It was to that question, to that matter of support, that AWS and Brigadier General Rowe, at the 5th Weather Wing's urging, took a closer look in the fall of 1975.

In a letter to AWS of 8 July 1975, the 5th Weather Wing forwarded a "status report" on tactical weather support concepts. It looked at contemporary concepts and policy, and future problems, regarding support to both the Army and Air Force. Addressing tactical weather support in the 1980s, the wing envisioned it revolving around AWS' centralized production facilities. It questioned whether their products would be timely enough to meet the needs of the tactical forces, and whether AFCS could get the products into the tactical arena. Looking at such future communications systems as Joint Tactical Information Display System (JTIDS) and WWMCCS, the wing was in doubt over which data would be transmitted over which system; which computer weathermen in the tactical arena would use, and whether it would be "ruggedized" and miniaturized for Army support; and what information did the centralized production facilities need from the tactical arena to provide the needed mission-tailored weather products? The wing recommended that a working group be formed to investigate such problems. The joint directives needed updating, the wing noting that "completing the joint regulation is a key item in any Army weather support program." "Better harmonization is mandatory at DA-DAF [the Army and Air Staff] level in the development of tactical meteorological equipments/sensors and . . . communications syutems," the wing concluded; "with today's 'crunch' on DoD resources, it is no longer practical for each Service to have a 'go-it-alone' policy."[28]

In response to the wing's concern, AWS convened a tactical weather support concepts conference at Scott AFB in mid-September 1975. In his opening remarks, Colonel Rowe said that AWS had to mesh all of its efforts in the tactical support area into one united effort. No longer could AWS afford the luxury of separate concepts, organizations, and operations, for tactical support of the Army and Air Force. He went on to say that AWS had to give equal and due emphasis to Army support, and insure that its concepts addressed the entire spectrum of contingency and war situations for all Army, Air Force, joint, or unified actions. The conferees ironed out a position for AWS to take at the Army's IAG meeting at Fort Huachuca the following month, as discussed previously; they debated the change in weather TOE "proponency" from Signal to Intelligence, and decided that, because AWS personnel knew too little about them, AWS publish a source document for all TOEs; they surfaced the need to shorten the processing time for SORs; and they agreed that AWS should try to establish a liaison office in the Department of the Army.[29]

During a conference at Headquarters AWS two months later, in November 1975, the weather wing commanders were presented the AWS policy on tactical weather support. There would be a single manager for the entire system: Headquarters AWS--the operations staff agency--would exercise overall management and make all policy decisions. Communications up and down the chain of command was very important, as was crossfeed among AWS units. Once AWS established policy and concepts for organization and operation, employment methods and operational procedures would be developed by the wings. Because of its broad range of support to tactical Air Force and Army units, 5th Weather Wing was designated as the AWS "executive agent" for developing operational procedures in tactical support.[30]

AWSM/R 55-2

Until January 1975, the directive which outlined its policies, concepts, and procedures in such areas was AWS Manual 55-2, *Operations: Weather Support for Joint Force Operations*, dated 30 March 1973. It superseded a November 1967 version and it addressed support to unified commands. It covered such things as the role of AFGWC, and the Air Force's MEFPAK system, including UTCs and MANFOR listings for weather team support to corps, divisons, and brigades.

One drawback with the manual was that, in addressing the critical issue of command and operational control of AWS forces supporting unified commands, which caused AWS embarrassment when it surfaced three times in Southeast Asia,[31] it left the door open to conflicting interpretations. At one point it stressed that AWS had to be responsive to the weather support requirements of Air Force and Army components of unified commands. Then it stated that "component force elements may be from various commands but *operational control* [author's italics] is assumed by the designated joint force commander as directed by the Joint Chiefs of Staff." To that point the issue seemed clear enough. Yet contradictory guidelines were introduced under a section headed "command relationships." "AWS is under the command jurisdiction," the section read,[32]

> of the Commander, MAC. *Command* of Air Force weather units is vested in the Commander, AWS. *Operational control* of AWS forces is normally exercised through AWS channels. However, deployed AWS units as organizational entities are under the *operational control* of the unified command's component forces to which they are attached. This does not negate *command control* throughout the vertical AWS command structure exercised over individual members of the deployed AWS units [author's italics].

The unanswered question was, who did AWS personnel supporting unified commands take orders from?

The 1973 manual was replaced by a regulation published on 3 January 1975, which also had a new title--"Operations: AWS Tactical Weather Support." In turn, it was superseded by a regulation with the same title, dated 31 August 1977, which remained in effect through the close of 1978.[33]

The 1977 version of the regulation was aimed at weather support to joint tactical forces in contingencies, and described concepts and doctrine adaptable for tactical operations involving NATO's combined forces and those of the United Nations Command in Korea. Responsibility for developing weather support concepts and policies were as presented at the November 1975 conference, but reference to the 5th Weather Wing as the "executive agent" for developing operational procedures was deleted in favor of letting each wing handle them individually.

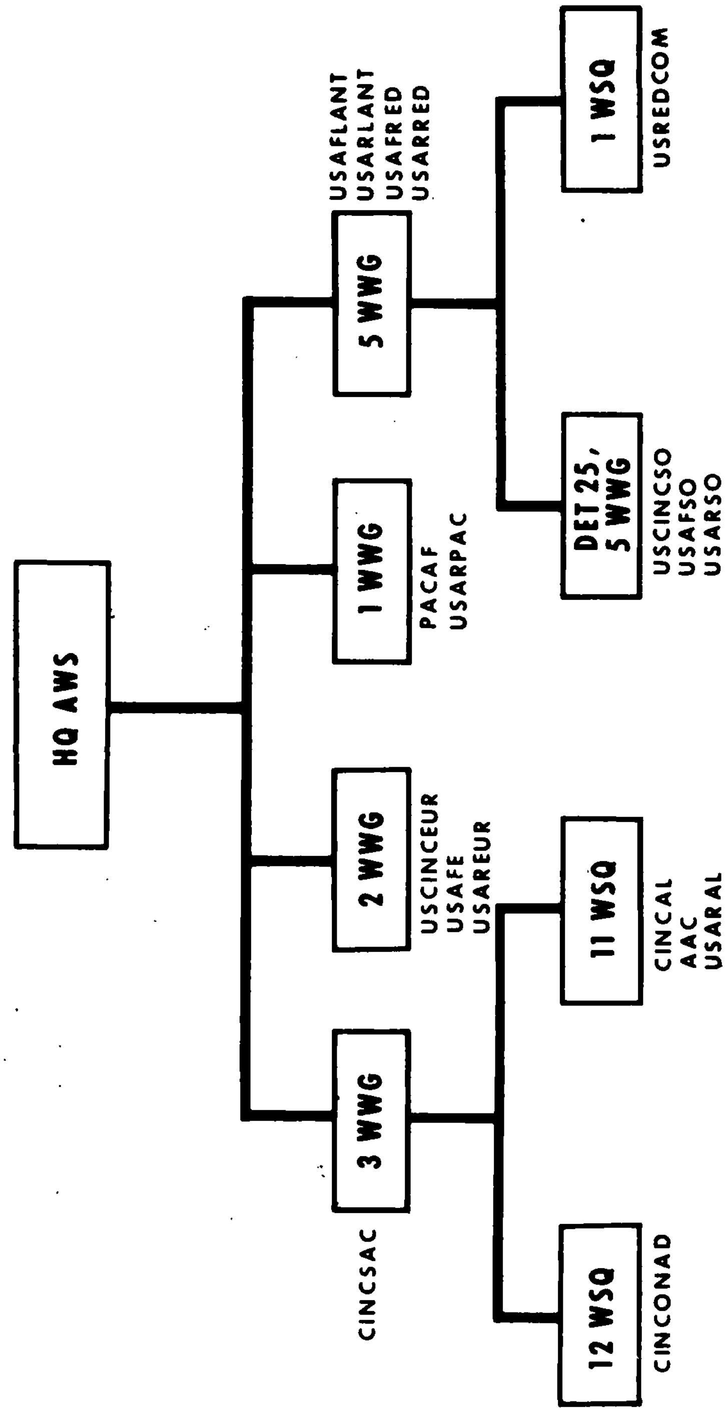
According to the regulation, the AWS concept of tactical weather support was built around three basic components: the centralized production system (AFGWC, USAF ETAC, and the AWN--Automated Weather [Communications] Network); the tactical forecast unit--a small forecast center, in effect; and weather teams, "the basic unit supporting customers in a tactical theater." It too explained the MEFPAC system, TOEs, and MTOEs. On the subject of Air Force tactical meteorological equipment, the regulation noted that the AN/TMQ-22 "has been designated by AWS as the primary piece of tactical observing equipment," but that the AN/PMQ-1 and 4, and the belt weather kit could be used as back-ups. It also contained a section regarding AWS policy on the use of Army tactical weather communications equipment.

The regulation cleared up the pivotal issue of command and operational control of AWS forces supporting unified commands. Clearly and simply, command and administrative control of AWS units would be exercised through established AWS command channels, but deployed AWS units or personnel were under the operational control of the unified command's component force to which they were attached. AWS units and people attached to an Army command were under the operational control of the Army commander, and under the staff supervision of the Army commander's Intelligence officer, the G-2.

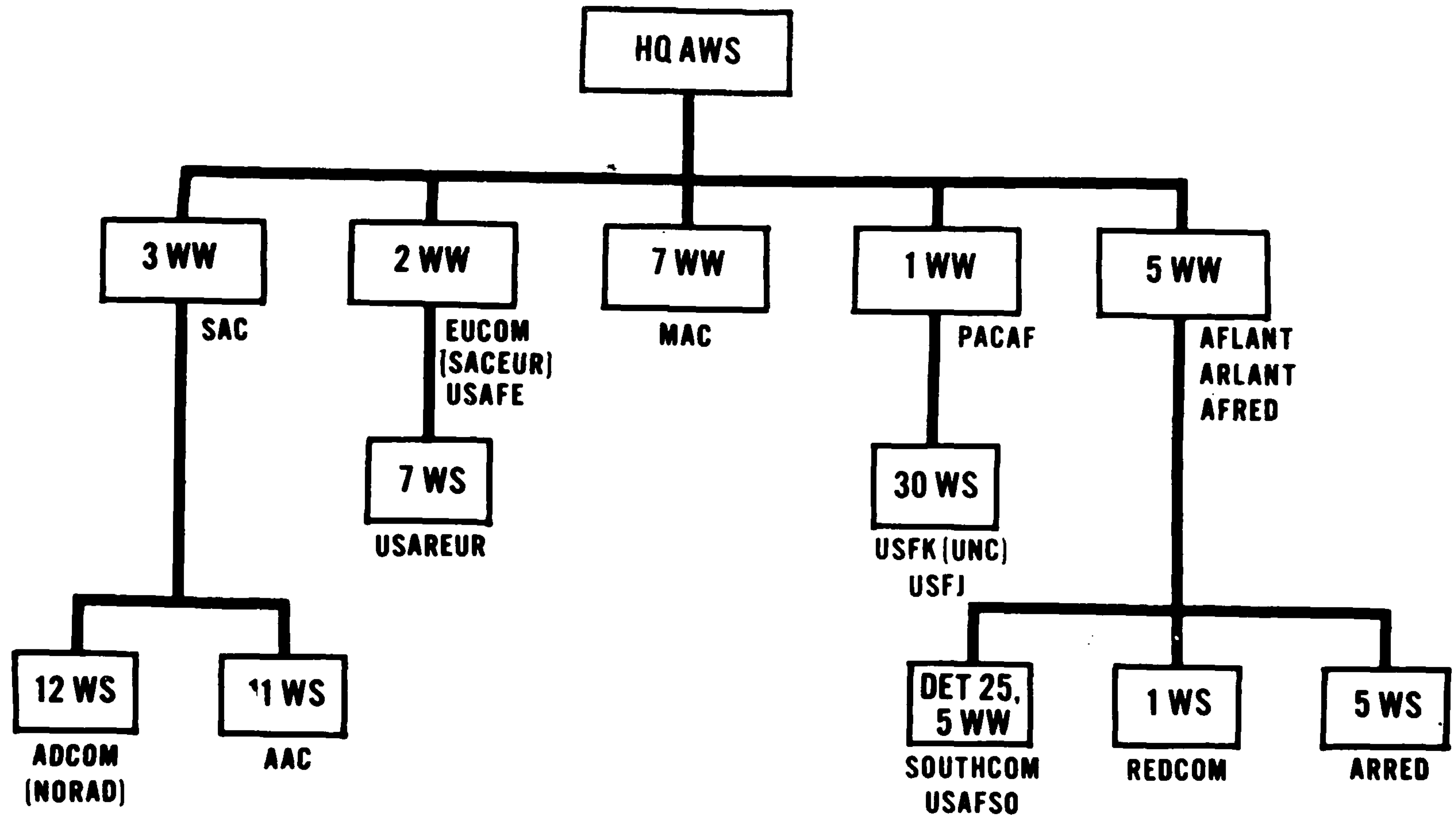
Army

There were many changes in underlying Army doctrine and field concepts in the 1960s and 1970s, but perhaps none were as far reaching

AWS RESPONSIBILITIES TO UNIFIED/SPECIFIED COMMANDS



AWS RESPONSIBILITIES TO UNIFIED, SPECIFIED, COMBINED, & COMPONENT COMMAND



COMBINED COMMANDS SHOWN IN PARENTHESIS ADJACENT TO THE US COMMAND as those incorporating use of the helicopter--which outgrew adolescence in the 1950s and gave birth to airmobility concepts tested by fire in Vietnam. "Airmobility came of age in Vietnam," testified Army chief of staff General Westmoreland before Congress in 1971; "it has changed the nature of ground warfare" and "has broad implications which extend far beyond Vietnam."[34] The helicopter significantly furthered infantry's mobility--an infantryman airlifted by "chopper" could move about the battlefield twenty times faster than his cousin with the foot infantry, and eight times as fast as mechanized forces.[35]

From airmobility arose the "Tricap" concept, bringing together for the first time in one division the triple capabilities of air cavalry, airmobile infantry, and armor to maximize combat power and battle area coverage. The 1st Armored Division at Fort Hood, redesignated as the 1st Cavalry Division in May 1971, was a "Tricap" division.

Nevertheless, infantry, the largest branch, held the upper hand in the Army. Of its sixteen active divisions in 1978, five were foot infantry; and of the thirteen Army chiefs of staff since World War II, nine were from the infantry, three from artillery, and only one was from armor.[36] Yet in 1978, a decade after the Tet offensive and five years after the last soldier left Vietnam, Army authorities informed Congress that the vast majority of their troops had not seen combat.[37]

Army doctrine in the 1970s dealt with such matters as increased weapons lethality, helicopter firepower, and the size of the battlefield; the role of the tank as the single most important weapon in the land battle;* shortages of tanks and armored personnel carriers; the need to train to fight outnumbered and with fewer weapons (though believed to be superior in firepower, accuracy, and lethality due to advantages in technology) than the enemy, yet win the first battle of the next war because it could well be the last battle; mechanization of the infantry (by the mid-1970s, one out of every two infantrymen was a member of an armored personnel carrier force); self-propelled artillery instead of towed; night fighting; electronic warfare as a form of combat power; and organizational and force structure trends stressing tactical mobility--mechanized and armored divisions combining the principles of maneuverability and firepower.[38]

Some numerical comparisons illustrated bedrock differences in Russian and American doctrine. The Russian army was the most tank heavy of any nation on earch--almost 16 tanks per 1,000 troops. A Russian armored division of about 9,500 men had 325 tanks; a United States armored division of approximately 16,500 men was equipped with 324. A Russian motorized rifle division of 12,000 men had up to 90 artillery pieces and 18 multiple rocket launchers; a United States mechanized division of 16,300 men had 66 artillery pieces.

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*The tank provided the bulk of the Army's firepower--about 36 percent. Moreover, the cost of its tank forces in 1978 amounted to only about 20 percent of the Army budget, and all of its tank crews totalled only 2 percent of its manpower. "Against an armor heavy Warsaw Pact threat, the tank is in fact the Army's most important system," Army officials told Congress in 1978; but "the one advantage that we've traditionally held over the Soviets, that of tank-for-tank quality, is rapidly disappearing." See U.S. Congress, Senate, Subcommittee of the Committee on Appropriations, *Hearings, Department*

Support of 197th Infantry Brigade at Fort Benning, GA, in March 1978: at the top, A/1C Russ J. Turley (left), an observer, and TSgt Paul D. Bradley, a forecaster, brief tank crewmember; in the bottom photo A/1C Turley is at left, and TSgt Bradley is at right. They were weather team members from Det 10, 5WS. (Photos by 1/Lt John M. Brown, USAF)

From the estimated 4.3 million men and women Russia kept under arms in 1978, it manned 169 divisions. Russia's tank inventory of approximately 45,000 compared with 9,247 tanks the United States Army could bring to bear in 1977; its armored personnel carriers and fighting vehicles numbered 55,000, while the United States total was 22,000; and it had 40,700 artillery pieces (including mortar and rocket launchers), compared to the 14,500 the United States had. Production rates between 1972 and 1976 favored Russia by a ratio of six to one in tanks, three to one in armored personnel carriers, and eight to one in artillery. In 1970 the United States Army had roughly 10,000 helicopters while Russian ground forces had 1,000; five years later the Army had 9,000 helicopters and Russia had 3,000.[39]

Looking at the likelihood of a short, violent, non-nuclear war in Europe, Army officials testified in 1978 that the possibility of a surprise attack under cover of adverse weather or darkness, or both, appeared strong. Over 40 percent of the Warsaw Pact's exercises were conducted at night, and the Russian soldier was constantly trained in snow and bad weather. With a short, limited mobilization, Warsaw Pact nations could strike in central Europe with 58 divisions armed with 16,000 tanks, supported by over 3,000 aircraft. Russian doctrine called for its forces to stockpile enough materiel to fight alone for approximately three weeks. They would advance at the rate of 20-to-40 kilometers per day in the breakthrough stage, and 50-to-80 kilometers in the exploitation phase. Russia fully expected to park its tanks along the English Channel a week after crossing the West German border.[40]

Other changes in Army concepts and doctrine, too numerous to enumerate here, sired some changes in Army weather support requirements. The helicopter's expanding role included Army expectations to offset tank shortages by arming "choppers" with sophisticated anti-tank weapons. But like the Air Force's electro-optical or laser-guided weapons, they were more sensitive to meteorological elements than conventional munitions. Israel's costly losses to hand-held, surface-to-air missiles in the Yom Kippur War of 1973 prompted the Army to look at NOE (Nap Of the Earth) helicopter assault tactics--tree-top flying with a minimum of avionics aboard. They required more precise forecasting. By 1977, Army doctrine placed more emphasis on the use of smoke as an obscurant on the modern battlefield,[41] resurfacing challenges in wind forecasting dating to at least World War I.

By 1978 changes in Army doctrine included dispersion of assets at the brigade level--or decentralized control of brigade-level operations. Because they were high priority targets for sabotage and direct enemy action, tactical automatic data processing systems were being re-evaluated as to their applicability in a highly mobile tactical environment, and Army emphasis was in the direction of less automation[42]--a direction diametrical to AWS'. Asked by a 7th Weather Squadron representative in January 1976 whether the Army was planning centralized or decentralized command and control of its forces, a CACDA officer replied that centralized command and control would likely exist down to the corps rear boundary, and decentralized control from there to the forward edge of the battle area.[43] "The Army will likely continue to operate with less centralization than the USAF," the 16th Weather Squadron operations officer reported the same month,[44]

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*(Cont) *of Defense Appropriations for Fiscal 1979*, 95th Cong, 2d Sess, Pt 4, 1978, p. 248.

General DePuy . . . will adopt *new techniques* to make up for our inferiority in number of personnel and equipment. New techniques may include tighter control of the division by the corps than in the past. An example of this is the use of airmobile units to defend or attack tank units. . . . It could be that weather support at corps can have more impact on decisions than in the past.

"The Bible": FM 100-5, *Operations*

"The Bible" on Army doctrine, which should have been a primer for all AWS personnel--top to bottom--directly or indirectly engaged in Army weather support, was Army Field Manual 100-5. A 6 September 1968 version entitled *Operation of Army Forces in the Field* was superseded by a version dated 1 July 1976, entitled simply *Operations*, which remained in effect through 1978. "This manual sets forth the basic concepts of US Army Doctrine," read the preface, which said it all: "these concepts form the foundation of what is taught in our service schools, and the guide for training and combat developments throughout the Army" and, "most important, this manual represents the principles for accomplishing the Army's primary mission - *winning the land battle*."[45] Described by the preface as the "capstone" of all Army field manuals, it was practical, comprehensive, attractively packaged, and easy to understand.

"Weather and terrain, although uncontrollable, must be used to our advantage," read a portion of the chapter on Intelligence:[46]

Weather factors must be considered and worked into tactical operation plans. Commanders who understand the limitations and advantages of weather and terrain can combine this with their knowledge of the enemy to tilt relative combat power in their favor.

Joint Conferences/Meetings

Heightened interest by the AWS leadership in its Army support mission resulted directly in several formal conferences and meetings with Army representatives in the 1970s. The first Army weather support conference hosted by AWS in the 1970s was held at Headquarters AWS on 27-28 April 1970. It was followed by conferences sponsored by AWS at its headquarters in January 1971 and on 20 February 1974, and another hosted by the 5th Weather Wing on 23-25 February 1977. An indication of the Army's interest was that two of its general officers attended the 1974 conference. Recurring themes through the conferences were austerity and manpower cuts in AWS, and how AWS hoped to bridge the gap in support through increased automation and centralization--embodied principally in AFGWC. The TESS study and the EAD decision were agenda items at the 1974 conference, among others, and it was agreed thereat to form a joint working group to handle mutual problems.[47]

Joint Working Group

The Army hosted the first meeting of the joint working group at Fort Leavenworth on 16 May 1974. It was established that the purpose

Three key staff chiefs from HQ AWS visited Det 3 of 5WW's 16WS at Fort Bragg, NC, in mid-Sep74 to see first hand some of the problems involved in weather support to the Army, and to investigate the potential for providing the Army centralized AWS support. Det 3 supported the XVIII Airborne Corps and 82d Airborne Division. Pictured from Det 3 are Sgt Mitchell D. Edwards (second from left) and Capt Wilbur G. Hugli (far right). From HQ AWS, from left to right, are Cols Joseph M. Tyndall, Castor Mendez-Vigo, and Hyko Gayikian, the deputy chiefs of staff, respectively, for aerospace sciences, systems, and operations. (USAF Photo) of the group was "to provide a forum to identify weaknesses and deficiencies and propose workable solutions to joint doctrine, concepts and procedures for weather support related to the *employment* of Army forces *in a theater of operations.*" Its objectives were "to identify mutually acceptable alternatives and/or solutions to selected parts of identified problems," and to make recommendations for resolving deficiencies.[48] Its scope was "limited to immediate or near term *obtainable goals* for improving joint aspects of weather support to the Army." By agreement, the co-chairmen of the group were selected by position instead of by name, and in the Air Force's case it was the assistant deputy chief of staff for operations at Headquarters AWS--a colonel's slot. The only agenda item at that meeting concerned concepts for weather support to the EAD corps.

The group's second meeting was held at Langley AFB on 22-23 October 1974. Primary topics of discussion included: inadequate tactical weather communications; the EAD decision's effect on weather support doctrine; the lack of appreciation by Army commanders and staff officers for the utility of weather service, and AWS officers unknowledgeable about Army doctrine, organization, and operations;* unrealistic testing of weather support concepts in the field due to considerations for flying safety, simulation of AWS centralized support from AFGWC, and the fact that fourteen-man weather teams were never fully manned; post-exercise reports that did not consistantly document all of the problem areas (i.e., absence of facsimile at corps and division, lack of weather radar and satellite readout capability, etc.); and the lack of an objective system for evaluating weather support procedures or Army useage of weather data, which perpetuated questionable TOEs, hindered development of meteorological equipment to meet justifiable requirements, and resulted in valid weather support procedures not being incorporated into joint doctrine. The group tasked the 16th Weather Squadron to develop and coordinate mission capability statements for EAD corps weather support organizations, and draft MEFPAK revisions to meet such missions, as well as coordinate TOE requirements to meet the proposed MEFPAK, and coordinate a position paper with USAICS for tactical weather communications requirements.[49]

One outcome of the conferences and meetings above, and the TESS study recommendations, was a letter in late 1974 from Brigadier General Heistand, the USAICS commandant at Fort Huachuca, urging TRADOC's schools to pay closer attention to weather and weather support problems in their curriculae: He mentioned instructions from General DePuy in which the TRADOC commander charged him to find ways to improve the integration of tactical intelligence from all sources. Weather was intelligence. Therefore, Army commanders and staffs had to use the staff weather officer in a more positive fashion. Heistand emphasized that the place to start was the Army school system. He encouraged use of realistic "bad weather" in school tactical exercises and war gaming which would penalize the student who ignored weather. "I am suggesting," Heistand wrote, "that a concerted effort to train our officers to constantly ask for weather information in specific terms may eventually lead to a level of demand for precise weather information sufficient to cause a significant step forward in that science."[50]

During the third meeting of the joint working group, held at Fort Huachuca on 20-21 January 1976, the attendees heard a briefing on AWDS as well as a pitch by AFGWC officials on centralized support to deployed Army forces. A review of the tasking from the second meeting included an update on the "proponency" issue--Signal or

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*The Department of the Army once asked the Air Force School at Chanute AFB, IL what source material they used. "Training For AWS

Intelligence--for weather team TOE support. The Army's Signal School did not send representation. It hampered a full discussion of tactical weather communications problems, according to the 16th Weather Squadron's operations officer, who wrote that "this lack of enthusiasm by the Signal School was one of the reasons we favored the Intelligence School's having proponency for weather." [51] Major action items from the meeting charged USAICS to transfer weather team support from Signal to Intelligence TOEs, while TRADOC and CACDA were to see about testing AWS' centralized weather support concepts in the annual Reforger exercises. [52]

One agenda item at the fourth meeting of the joint working group, convened at Headquarters AWS on 13-through-15 October 1976, was TRADOC's strawman revision of the joint regulation. The question of Army reimbursement for services rendered surfaced again, but was shelved as being beyond the group's purview. Discussed also was a new pamphlet AWS published in August 1976 entitled *Training: Army Staff Weather Officer Guide*. [53] AWS agents reported on the FALOP system, and use of the new MSI concept (Mission Success Indicator--a fancy new title for the old probability forecasting technique) in the Reforger 76 exercise in Europe that fall--the first real incorporation of centralized support (AFGWC) to tactical Army operations, Brigadier General Rowe presumptiously labeling it "a significant turning point in the history of Air Weather Service." [54]

AFGWC provided MSI forecasts for four "operational decision thresholds" involving the employment of tanks, helicopters, and close air support aircraft in Reforger 76. [55] Post-exercise reports from the AWS units involved indicated that MSI products, when combined with conventional weather support, had the potential to magnify the Army's combat effectiveness. However, MSI forecasts during Reforger 76 were of "questionable value," as one report read. [56] Army commanders and staff officers lacked training in their use and did not like "kill factors" included in the MSIs. Additionally, AWS needed to refine the concept as applied to Army support--i.e., determine how to get MSIs from AFGWC over existing communications systems to a corps' deployed units; increase the density of the grid points because the grids in Reforger 76 were so coarse that they did not always coincide with the area of operations; etc.

During Reforger 77 and 78 centralized probability forecasting in support of tactical Army units was a huge disappointment. For Reforger 77 it was limited to climatological MSIs because AFGWC and AWS recognized the need to conduct a "major reprogramming" in order to meet the Army's weather support requirements in Europe, as postulated by the 7th Weather Squadron. [57]

The probability technique was dressed with yet another title for Reforger 78--Weather Impact Indicator, WII. Because he was taking so much flak from Army commanders about combining weather and operational data into MSIs telling customers their probability of mission success, Brigadier General Rowe decided AWS had better stick to more traditional methods of furnishing the weather input to the decision making process. Thus, WIIs were introduced in 1978, and Rowe determined that AWS would supply MSIs to customers only when asked for. WIIs contained weather information only. No matter. They failed to neutralize the acid distaste Army tactical commanders had for the

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*(Cont) personnel on Army organization and concepts," read the classic reply, "was taken from the *Air Force Times* and *Aviation Week [& Space Technology]* magazine." Shortly afterward, TRADOC was ordered to furnish Chanute with somewhat more authoritative source material. (See ltr Mr. Beck, Dept of Army (DAMI-ISP) to MAC (HO), "AWS Support to the U.S. Army: Vietnam to AWDS," n.d. (*circa* Mar80).

Working on a probability forecast in support of the 2d Armored Cavalry Regiment during Reforger 77 is Capt Alan E. Ronn of 7WS' Det 1. (USAF Photo by TSgt Phillip D. Henderson)

underlying probability concept. In fact, due to communications difficulties, WIIs from AFGWC were received by only one customer, the 3d Armored Division, and then only for one week of the one month deployment during Reforger 78. The division's decision makers preferred categorical forecasts. They spurned 7th Weather Squadron efforts to use WIIs in mission planning and execution. Acknowledging that MSIs and WIIs were concepts undergoing testing, the 7th Weather Squadron concluded that, not only were there technical problems with the products, most Army customers did not understand how to use probabilities in decision making; and, while its own forecasters understood probabilities, they were uncomfortable with them and therefore lacked confidence in them.[58]

Thus, the ultimate questions to be answered through exercises such as Reforger were: was there a role for AFGWC support to the tactical Army and, if so, to what degree--what mix of local and specialized support?

The Army Signal School was once again not represented at the fifth meeting of the joint working group, conducted at Fort Sill in mid-April 1977. One of the discussion items addressed communications shortcomings continuing to plague field weather support. Among other action items established at the meeting was one to proscribe procedures for requesting wartime weather modification support from AWS and, because of the need for more of them in the tactical area of operations, getting artillery

Army and Air Force Special Forces: much of AWS' capability to support unconventional warfare operations resided with the 3WS's Det 75 at Hurlburt Field, FL. Men from that unit saw action in the Dominican Republic in 1965, and in Laos and Cambodia from 1965 through 1973. Pictured here from that unit in scenes shot in 1977 are: TSgt George M. Scott (billed cap with jump wings); SrA Gary A. Ferracane (holding balloon); and SrA Thomas R. Austin (sitting in front of raft). (Photos by TSgt Dan Doherty, USAF)

meteorological sections to take limited surface observations.

Additionally, Lieutenant Colonel Macy, AWS' staff weather officer at USAICS, was to develop the necessary doctrine and TOEs for weather teams supporting Army Special Forces--neither of which existed at the time, although SORs had been prepared for direct weather support to Special Forces and the UTCs were ready for approval.[59] The issue arose in mid-1976 when the 5th Weather Wing asked its 16th Weather Squadron to reconfirm the need for direct weather support to Army Special Forces--the squadron replying that there was a need down to Special Forces' operations base level.[60]

With inputs from Lieutenant Colonel Macy and selected AWS units, and guided by Brigadier General Rowe's November 1977 decree addressed below that AWS would provide direct forecasting support to only the highest echelon Special Forces unit in a theater of operations,[61] the 5th Weather Wing forwarded for Headquarters AWS' endorsement in April 1978 a concept for weather support to Special Forces unconventional warfare operations.[62] It noted that little by way of formal concepts and doctrine had been accomplished by AWS in the area. It recommended that AWS provide staff weather officer and direct forecasting support to Army and Air Force Special Forces at both the joint unconventional warfare task force level, and at Army forward operation bases and Air Force Special Forces facilities--four-man teams at both levels, comprised of an officer and three dually-qualified (forecaster and observer) enlisted men, all parachute qualified. Below those levels, either at remote forward bases or behind enemy lines, AWS personnel would be employed only when the mission demanded it--such as from 1965 to 1973 in Laos where the American ambassador overruled repeated objections by AWS authorities to having their people working clandestinely under hazardous conditions to obtain observations they believed were of questionable value.[63]

The conferences and the meetings of the joint working group outlined above were worthwhile if for no other reason than providing a continuing forum for dialogue between Air Force and Army personnel wrestling with the problems of furnishing weather support to the Army. While progress toward solving many of them moved at a tortoise's pace, at least the far-flung outlands of the Air Force and Army bureaucracies were talking and working with one another. "My personal feeling is that these meetings are a definite step in the right direction," astutely observed Lieutenant Colonel Owens, the staff weather officer to USAICS; however, "progress will be much slower than the real-world situation demands."[64] The meetings resolved some headaches, "but the hard core issues ultimately disintegrate into a jurisdictional debate of who is responsible for funding, manpower, etc.," AWS noted, "*cooperation stops when resources are needed* [author's italics]."[65]

FM 31-3/AFM 105-4, 1969

The problem with AWS' directives addressing joint force or tactical weather support--such as the 55-2 manual or regulation--was that they carried little or no weight in unified commands. As the 2d Weather Wing reminded AWS in late 1975, "even though the 2WW is obliged to comply with AWSR 55-2, USEUCOM, component commands, or other commands are not bound to recognize such [an] AWS document."[66] The governing weather directive for joint forces was JCS Publication 2--more commonly referred to as "JCS Pub 2." Yet its wording was vague and contradictory. For instance, on the key issues of command and operational control of AWS elements supporting unified or specified commands, the November 1959 version of JCS Pub 2 left the door open for either the AWS, MAC, or unified command commander to exercise such power, while the version replacing it in October 1975--which was in effect through 1978--did not even address the issue![67] Thus, basic doctrine and policy governing weather support to Army elements--either unilaterally or as components of unified commands--was left to the joint Army-Air Force regulation and manual, for the most part. The consensus by those most closely involved in the 1970s was that the joint regulation and manual were in dire need of revision.

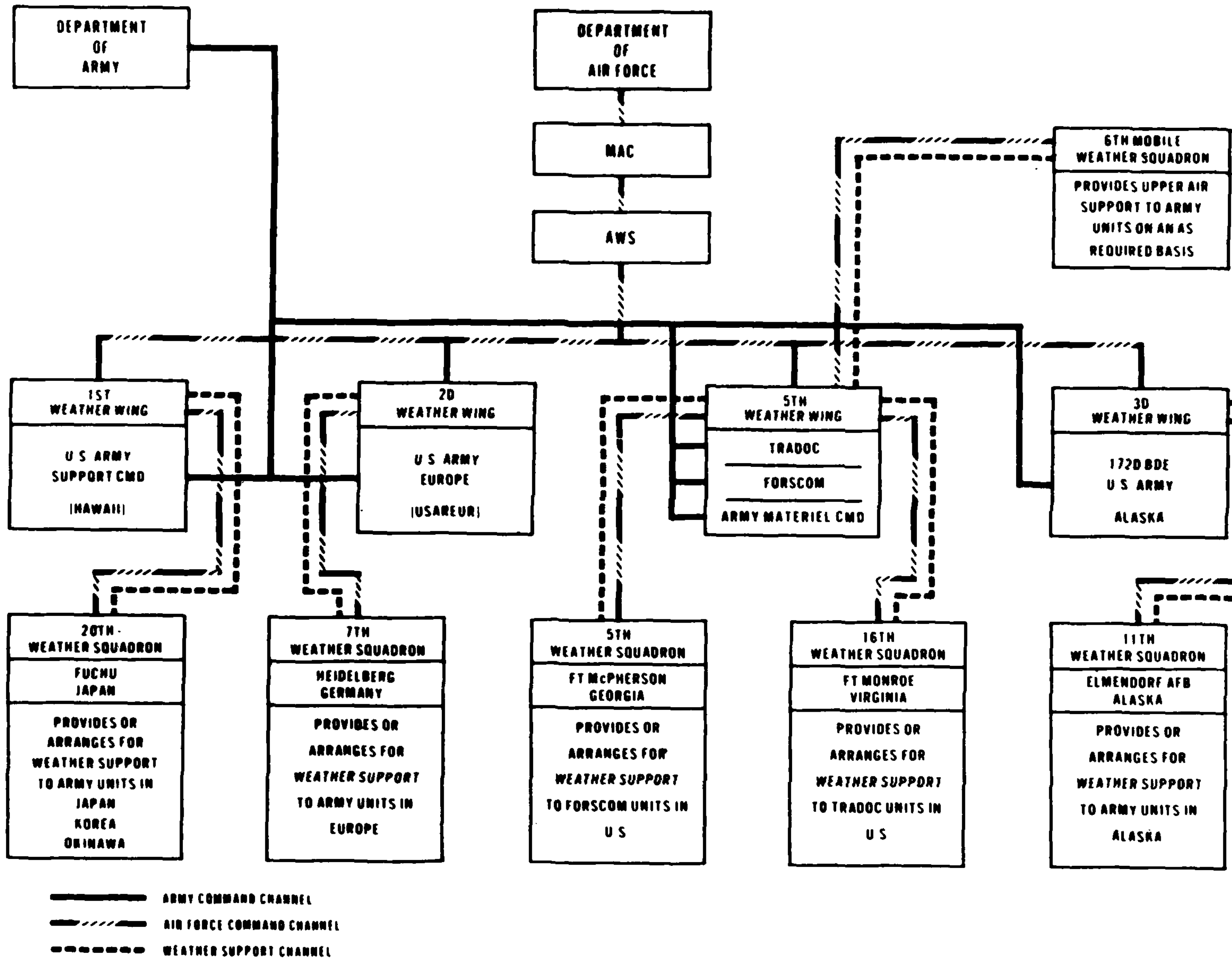
As the 1970s opened, the original version of Army Field Manual 31-3/Air Force Manual 105-4, *Weather Support for Field Army Tactical Operations*, dated December 1969, was in effect. It culminated five years of sensitive negotiations between the Army and Air Force--but it was outdated almost as soon as published! Efforts were undertaken immediately to revise it. As it had traditionally, AWS wanted emphasis focused on the Army's responsibility to define more specifically its weather support requirements--among other drawbacks it saw with the manual.[68]

From the Army's point of view, it wanted changes too, particularly after its EAD decision of mid-1973, and in September 1974 USAICS suggested to the Air Staff's assistant for weather (AF/PRW) that the Army and Air Force conduct a "pre-revision review" of the joint manual.[69] AF/PRW recommended that a revision of the manual be delayed until the joint regulation was rewritten, but agreed that a preliminary revision could be used as a test manual.[70] Asked by AF/PRW for inputs,[71] AWS provided comments through MAC and, in early December 1974, AF/PRW passed them to USAICS.[72]

In October 1973, the Army transferred "proponency" for the joint manual from the Signal School to USAICS, but work was shelved until the dust settled from projects that would bear on it, such as TARS-75, MASSTER, TESS, and others. It was late 1976 before Lieutenant Colonel Owen Y. Macy, AWS' staff weather officer to USAICS, was finally able to devote more time and attention to a revision. USAICS distributed Macy's "coordination draft" on 3 June 1977. The 5th Weather Wing made an input, and acted as the Air Force focal point for staffing Air Staff and AWS comments.[73] By October 1977, Macy had comments from all the major Army units except USAREUR, but CACDA reportedly recommended delaying publication of the manual until the weather requirements from the Army tactical commanders conference of August 1977 were approved.[74] Moreover, with Brigadier General Rowe's dramatic response in December to the Army's proposed rewrite of the joint regulation, work on the joint manual was again shelved.

In effect through 1975, therefore, was the original December 1969 version of FM 31-3/AFM 105-4. It was a cookbook, of sorts, containing step-by-step elaboration on how to implement weather support policy and concepts spelled out in the joint regulation. Yet while it amplified Army and AWS doctrine regarding weather support to field army tactical operations, it did not go into support of garrison operations, artillery, Army aviation, or Army research and development.

Under the manual--and, of course, the joint regulation--the Army was to furnish meteorological support for artillery fire, river stage



1975 ARMY WEATHER SUPPORT STRUCTURE.

and flood forecasting, observations by Army units with organic observation capabilities, and observations forward of division--except, as the manual read, "that brigades will usually include an assigned AWS met team." AWS was responsible for all other support to Army tactical units--including, according to AWS' 1975 supplement to the manual, direct support to each Army echelon from major commands to brigades and armored cavalry regiments when required.

The joint manual of 1969 stressed weather as an element of intelligence, equal in importance to field army tactical operations as terrain and climate. It spelled out in some detail the urgency for teamwork among the Army's staff Intelligence officers and AWS' weather teams and staff weather officers. Access by the staff weather officer to the Army unit commander and his staff was through the Intelligence officer, the G-2. In addition to being accountable for assuring that the AWS weather team was provided authorized communications, logistics, and administrative support by the Army, and informing subordinate Army units of the staff weather officers' observation requirements, the staff Intelligence officer at each Army echelon was responsible for initiating, coordinating, and consolidating Army requirements for weather support with the staff weather officer. A section of the manual contained the weather support requirements of all field army agencies and elements, but it stressed that they should be considered as guidelines only, that specific requirements should be set forth--usually by the Intelligence officer and staff weather officer--in weather annexes to the Army units' operations plans.

The operational control of AWS personnel supporting Army units was not discussed, but the manual specified that the AWS commander would establish, administer, and exercise "command jurisdiction" over AWS units supporting the Army.

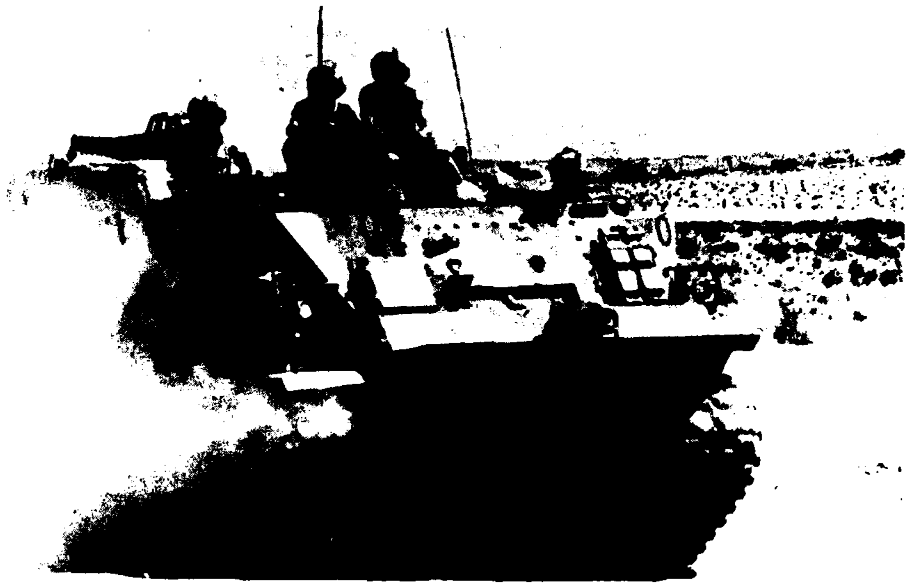
In other of the manual's highlights, AWS' centralization and data automation concepts--as embodied by AFGWC--were emphasized. The Army was to furnish administrative and logistical support to AWS elements, including weapons, field rations, vehicles, work facilities, and communications--teletypewriters, facsimile, and terminal equipment and maintenance. AWS was to provide and maintain all tactical meteorological observing and forecasting equipment used by its people, and insure they were adequately trained in how to get along and survive in the field. And finally, on the crucial issue of communications, the Air Force (AFCS) was responsible for furnishing and maintaining long-line weather communications down to the weather team at the field army level (or "major tactical maneuver force"). Beyond that point the Army was accountable for the local collection and exchange of weather data, and for the dissemination of forecasts and weather reports.[75]

AR 115-10/AFR 105-3, 1970

One of the main reasons why work on revising the joint manual dragged so was that it was somewhat dependent on the joint regulation and efforts to bring the 1970 edition up to date. But, as discussed below, agreement could not be reached on a rewrite of the joint regulation and, therefore, the 1970 edition remained in effect through 1978.

The 1970 version of Army Regulation 115-10/Air Force Regulation 105-3, entitled "Environmental Services: Meteorological Support for the U.S. Army," had a 1 June date of publication but did not go into effect until 1 August 1970. It superseded the 23-March-1962 edition reviewed in the first chapter herein.

As the primary document expressing Army and Air Force policy and concepts for furnishing weather support to the Army, the joint regulation published in 1970 directed the Army to advise the Air Force of its requirements for direct weather service during peacetime



Trafficability Problems *(USAF photos): Under a Signal Corps contract awarded in 1953, Oregon State College examined weather's effects on over 3,000 major Army actions in WW-II and Korea, concluding that the operation most often sensitive to weather was trafficability (about 45% of the instances of Army operations affected by weather), followed by tactical air support--about 24% of the instances. In the 1970s, the Army still considered soil trafficability its biggest weather-restricted operation, more so than weather's effects on tactical air support or Army aviation. A major mission analysis of AWS completed by AFSC's SAMSO in 1970 concluded that adequate procedures for operational soil trafficability forecasts did not exist, and recommended a joint board be formed by the Corps of Engineers and AWS to establish a workable division of responsibility for soil trafficability forecasts, and to devise a methodology for making such forecasts. (See: Dr. Fred W. Decker, Russell L. Lincoln, and John A. Day, Oregon State College, seventh quarterly progress rprt, 15Jan-14Apr56,* Weather Effect on Army Operations; *and Vol I, "Narrative," pp. 349-65, of "History of Air Weather Service," 1Jul70-30Jun71.)*

field and garrison operations. "Army contingency or war plans which require Air Force weather service will include a weather annex," the directive read; "initial wartime or contingency weather service requirements will normally be satisfied from resources previously allocated to support Army peacetime operations," and, in a departure from the earlier version, "Air Force weather units supporting Army tactical units will accompany Army units when deployed."[76]

The guts of the joint regulation lay in a section addressing responsibilities. In a change from the earlier version, the Army was to fulfill its own needs for soil trafficability forecasting. Weather observing and observations--but not forecasts and forecasting--forward of division headquarters was the Army's job; however, the critical ambiguity in the 1962 version remained: "this will not exclude placing Air Force weather personnel at brigade locations and in other forward areas when required by appropriate plans or circumstances." Otherwise, the Air Force, through AWS, would provide or arrange for all other Army operational weather support--including forecasting service (direct or remote) forward of division.

Unlike the joint manual, the joint regulation specified that the AWS staff weather officer at all Army echelons would come under the operational control of the Army commander supported, and under the staff supervision of the Intelligence officer--although he was free to coordinate weather matters directly with the Army commander and his staff agencies. Staff weather officers were to assist Army units in determining their weather support requirements, but the unit Intelligence officer was to coordinate them. The Army would provide personnel to take forward-area observations, and the Intelligence officer would disseminate processed weather information to appropriate command elements.

The joint regulation directed the Army to furnish AWS units logistics support equitable with that supplied to Army units of comparable size and activity--to include field and depot maintenance to Army vehicles and equipment assigned AWS units, working and living facilities, supply items, field clothing and equipment, and mess facilities. A paragraph not present in the 1962 version stressed the Army's responsibility for furnishing equipment listed in the weather section of the supported unit's TOE. The Air Force was to provide and repair fixed and tactical weather gear needed by AWS units but, in a provision not in the 1962 version, any Air Force weather gear operating in combat had to meet the Army's criteria for tactical mobility, target signature, cross-service maintainability, and acceptability in the Army electromagnetic environment. Moreover, based on AWS' experiences with Army support in Vietnam, another loophole was added to the joint regulation whereby the Air Force was to furnish AWS units and personnel with mission-essential equipment and supplies "not readily available through Army supply channels."

Another key section of the joint regulation addressed weather communications responsibilities. At Army installations the Air Force (AFCS) would provide, install, operate, and repair terminal communications equipment needed by AWS units providing direct support to Army elements, while the Army was to do likewise for "mainframe termination and on-post circuitry." For tactical forces in the field, the Air Force (AFCS) would provide, install, operate, and maintain complete weather communications systems down to and including the field army headquarters, while the Army would do so for AWS units providing direct weather support below that level. However, in deference to AWS' bitter experiences in Vietnam, the joint regulation recognized that "situations may arise where provision of adequate communications will require local *adjustments of* [the] *responsibilities* [author's italics]" it established. Therefore, it contained one other significant loophole whereby the Air Force (AFCS) was responsible for all weather communications below the field army headquarters whenever the needed equipment was not available in Army resources.

In summary, the Air Force and AWS believed they had been forced to make substantial concessions to the Army in the 1970 edition of the joint regulation because of a basic fact of life: experience in countless field exercises and in Vietnam combat proved that the Army was incapable, or unwilling (or both), to uphold its end of the bargain under the joint regulation. The Army was supposed to provide observations forward of division but did not, for the most part, and hence the provision in the joint regulation that AWS would help fill the gap. The Army was supposed to provide logistics support to AWS weather teams but did not, for the most part, and hence the provision for the Air Force to do so. The Army was supposed to take care of AWS' communications needs below the field army level but did not, for the most part, and hence the provision for AFCS to take up the slack.

From those same experiences, for the Army's part, it knew that, under the stratagem that the formal weather support requirements expressed by the Army were not specific enough, the Air Force and AWS were niggardly in allocating manpower to meet the Army's needs. There were not enough AWS personnel allocated to meet the Army's war or extended contingency needs, despite Air Force assurances that peacetime "cadre" weather teams could be, and would be, beefed up to authorized strength. The people AWS did provide were not generally disposed or prepared to live and function by their shoestrings in a spartan field environment or in the hazards of combat. They were "data hogs," and the weather and communications gear they insisted on dragging to the field to appease their appetites was too sophisticated and unwieldy; garrison "nice-to-haves" were impractical in the field. In short, the Army knew that AWS was not doing, or could not do, all that should be done to furnish the weather support it needed to fight and win the land battle.

Air Staff's Proposed Revision

With such misgivings and suspicions evident on behalf of both services, it was not long before attempts surfaced to revise the joint regulation of 1970.

In October 1972, following preliminary efforts at the working level, the Air Staff invited the Department of the Army to join it in undertaking a comprehensive review of the joint regulation, particularly with a view toward solving the cardinal issue of how to meet the Army's increased requirements for direct weather support (including observing service forward of division) at a time when the Air Staff felt compelled to cut AWS' manpower because of budget pressures.[77]

The invitation was drafted by Colonel Mortimer F. Bennet, the Air Staff's assistant for weather--AF/PRW. In 1971, prior to his Air Staff assignment, Bennet was stationed in Vietnam commanding AWS' 1st Weather Group, whose 5th Weather Squadron supported Army units there.

Very familiar with the problems associated with supporting the Army in combat, Bennet viewed his position on the Air Staff as opportune for channeling high-level attention to dissolving them.

After the Army reflected receptiveness to a review, Colonel Bennet hosted a meeting of MAC and AWS representatives in early April 1973 to iron out an Air Force position. Sitting in on the discussion was Salvatore R. LeMole, a lieutenant colonel from Bennet's office who eventually did much of the work incorporating his boss' guidelines into the revision. Representing MAC was Colonel Alfred C. Molla, Jr.[78] LeMole and Molla were career weather officers who later served at Headquarters AWS during Brigadier General Rowe's administration--the former as Rowe's deputy for operations before replacing the latter as AWS vice commander in August 1978. Before 1972, when AWS transferred him to Vietnam to succeed Bennet as the 1st Weather Group commander, Rowe pulled a tour with AF/PRW and was the "action officer" who pushed the 1970 edition of the joint regulation through the cumbersome coordination process--complete with the loopholes AF/PRW wanted.[79]

At the April 1973 meeting, Colonel Bennet tried to assure the MAC and AWS representatives that the review was not intended as a means to cut more AWS manpower; instead, in repeating the instructions his boss on the Air Staff had given the AWS commander (Brigadier General Best), Bennet said it was to insure that AWS support to the Army was of a quality comparable to that furnished the Air Force.[80] In later recalling that period, Colonel LeMole said that Bennet wanted to "straighten out" the roles and missions of those involved in weather support to the Army; both believed that, if necessary to obtain resolution, the issue should have been elevated to the secretarial level in the Departments of the Army and Air Force.[81] Furthermore, about that time LeMole was being told informally by the officer (a major) responsible for such matters at the Department of the Army that, with Mrs. Frances Whedon retired, the Army was about ready to seriously entertain the notion of AWS' assuming the entire Army weather support mission. While LeMole was skeptical, the opportunity to review the joint regulation might provide the impetus.

On the subject of weather support forward of division, according to the AWS report of that meeting,[82]

> all parties agreed that the joint regulation should not be changed--that AWS support forward of division level should be based on USAF requirements, not Army. Although it may be politically advantageous to have the paperwork recognize these AWS authorizations in a USAF PEC [Program Element Code, an Air Force manpower management system that tabbed each authorized slot with a function category--i.e., Army support, weather central operations, etc.], there is no known clear way of doing this yet retaining Army administrative support. Therefore, it was decided to leave the Army TO&E and organic weather team wiring diagram alone. Future Air Staff and MAC replies to SORs requesting support at brigade level will state that the weather service is primarily in support of USAF requirements.

In Colonel Bennet's opinion, based on his tour in Vietnam, the Army believed that "a 'blue suiter' in combat is a liability"--could not pull his weight.[83] Hence, the position the Army took with the joint regulation of keeping AWS weathermen off the battlefield, back at the division headquarters or airfield. Nevertheless, Bennet and AWS saw a vital need for observations forward of division and decided to keep their sleeves rolled up and continue doing the job.[84] That loophole would remain. Finally, Colonel Molla and the AWS representative agreed that the regulation should direct AWS to support the Army National Guard and Army Reserve forces--on a reimbursable basis for all direct support rendered.

"The new executive game in the Pentagon," Colonel Bennet informed the AWS leadership in July 1973, was "M.B.P. ('Make the Bastards Pay')," and he relayed Air Staff concern that AWS "is one of the [Air Force's] largest, if not *the* largest, giver of gratis support to the Army."[85] Behind the Pentagon's novel "executive game" was a new Defense Department directive, numbered 4000.19,[86] which attended the subject of reimbursement between branches of the military for services rendered each other. In fact, when 4000.19 originally hit the streets in early 1972, the military branches were given ninety days to get all interservice support agreements reviewed and revised in compliance with the new directive. While the subsequent furor by the military branches was successful in delaying implementation of 4000.19, it was still to be complied with. In reply to specific queries by MAC, Air Staff guidance in early 1973 on 4000.19 was that the joint regulation, which was still valid, "establishes that interservice support integral to the Air Force's provision of weather services to the Army will be on a non-reimbursable basis," but "the fact that . . . Air Weather Service has a mission to support another service is not by itself sufficient justification to establish that interservice support will be non-reimbursable."[87] "The senior people of the Air Force are wondering why they have to provide people [and] resources . . . to support" the Army, Bennet cautioned the AWS leadership a few months later while briefing them on 4000.19.[88]

Thus, in October 1973, when Colonel Bennet was finally able to submit a proposed rewrite of the joint regulation to MAC and AWS for review, its most controversial provision--driven by 4000.19--called for the Army to reimburse the Air Force for all non-tactical meteorological support it enjoyed from AWS. Other major objectives of the rewrite were to tie Army SOR processing to the annual budget cycle, tighten management of AWS resources allocated to Army support, clarify and redefine the Army's and AWS' responsibilities, and expand the definition of weather support to the Army to include Army National Guard and Army Reserve forces. Although Bennet and his staff continued to maintain that Air Staff pressure to whittle AWS manpower was not a consideration in the revision attempt, his cover letter noted that the reimbursement provision could save the Air Force up to 200 AWS manpower authorizations. In a reply drafted by Colonel Molla, MAC, in concert with AWS,* objected vehemently to Bennet's rewrite. MAC and AWS believed that meteorological support to the Army should be provided on a "common service" basis without reimbursement, and Molla's letter went on to imply that if the regulation's definition of Army support encompassed reserve forces, it would more than eat up the 200 spaces that might be saved by making the Army pay.[89]

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*Because of a tight deadline for a response to MAC and the Air Staff, AWS was only able to contact the 5th Weather Wing and its 16th Weather Squadron for opinions on Col Bennet's rewrite. Both units opposed the reimbursement provision. See: ltr Col Isaac S. Israel, 16WS comdr, to 5WW, "Draft AR 115-10/AFR 105-3," 26Oct73; and ltr Lt Col Joseph E. Tucker, ch, ops and trng br, ops div, HQ 5WW, to AWS (DOQ), "Draft AR 115-10/AFR 105-3," 30Oct73--both included within Sup Doc #18 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, Colonel Bennet met with Colonel Molla and AWS officials at Headquarters AWS in late February 1974 to resolve their differences before submitting a rewrite for the Army's consideration. Bennet conveyed the Air Staff position that the precedent of AWS' providing meteorological service to the Army on a non-reimbursable basis prior to 4000.19 did not warrant a continuation of that practice, MAC's concern, as professed by Molla, was not with the theory of reimbursement, but with knotty mechanics of implementing an accounting system for AWS support to the Army that would result in an overall savings to the Defense Department.[90] Compromise was reached on most chokepoints, but Bennet was intrasigent on reimbursement.[91] Despite AWS' and MAC's consternation over the reimbursement issue, Bennet took back to the Air Staff an agreed-to rewrite of the joint regulation--copies of which AWS distributed to its wings for information purposes in May 1974.[92]

Because of the Army's distaste for the reimbursement provision, Colonel Bennet never submitted his proposed rewrite of the joint regulation to the Army for formal consideration. In recalling the situation, Colonel William E. Cummins, who succeeded Bennet at AF/PRW in August 1975, said that preliminary informal probing by Bennet's people with the Department of the Army uncovered unyielding resoluteness in the affair. To begin with, the Army took the position that all AWS service was tactical support and that 4000.19 excluded reimbursement by one branch to another for tactical support. Secondly, the Army reminded Bennet's people of the roles and missions agreements under the National Security Act of 1947 whereby the Air Force would furnish meteorological service to the Army. Therefore, the Army's informal response to Bennet's people was "please continue your efforts along those lines"--in Cummins' paraphrasing of the exact words used.[93] When AWS inquired in August 1975 as to the status of the proposed rewrite, Cummins replied that "this complex matter is getting additional attention, but we see no possibility of a revision in the immediate future."[94]

Army's Proposed Revision

In view of the Army-Air Force standoff in 1975, Colonel Cummins did not feel he could get the Air Staff to reopen the case for revising the joint regulation. Instead, he envisioned an alternate, two-prong approach to the problem. First, he thought he could get the Army to initiate a rewrite because Mr. Beck was handling weather affairs at the Department of the Army, and Beck was anxious to bring the regulation up to date. "We could really work with him," Cummins said of the ex-AWS officer, meaning that Beck was amenable to removing the roadblocks to satisfactory support of the Army. Through Beck, Cummins said, "we finally had the Army in such a position that we felt that we could make the kinds of changes [in doctrine, through the joint regulation] we wanted."[95] Secondly, Cummins believed the regulation should be approached on a "piecemeal" evolutionary manner--i.e., by issuing immediate changes to clean up such long-standing issues as tactical weather communications, while leaving more profound and weighty issues like basic doctrine to a total rewrite. It paralleled closely a recommendation from the joint Army-

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*(Cont) itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

Air Force working group on Army weather support, which prompted TRADOC, in a letter to the Department of the Army on 24 January 1975, to submit a change in the joint regulation regarding tactical weather communications. The Department of the Army agreed to the change, but indicated that it would not be included until the regulation was next revised.[96]

Colonel Cummins' efforts were buttressed by a timely visit to the Department of the Army and Mr. Beck's office in early 1976 by the AWS commander, Brigadier General Rowe. On 13 July 1976, in a letter drafted by Beck, the Department of the Army directed TRADOC to review the joint regulation and suggest changes.[97] One year later, on 4 July 1977, TRADOC forwarded a proposed rewrite but, since there was disagreement among several major Army commands, the Department of the Army--Beck--hosted a meeting to resolve the differences.[98] Reporting on the disagreements, the staff weather officer to USAICS, Lieutenant Colonel Macy, wrote that "several axes were being ground," and that "the materiel developers--ECOM and ASL--are attempting to develop within the draft regulation a requirement for the Army to establish a forecasting capability and satellite program."[99] Macy's input to the Army meeting included recommendations that the regulation bring specific roles into clearer focus, but blur the distinction between peacetime and wartime support because the former was often translated into garrison airfield support while, in actuality, the Army trained for war during peace; and that it direct AWS weather teams to support brigade-level operations.

In September 1977, a proposed rewrite of the joint regulation was forwarded for review by the Department of the Army to the Air Staff who, in turn, passed it to MAC and AWS for comment.[100] The Army rewrite broadened the directive's scope to include support of Army reserve components, but made no mention of reimbursing the Air Force for non-tactical support furnished by AWS. Army and Air Force weather communications, logistics, and administrative support specified under the directive would be tendered on a "common-service" basis. Traditional Army and Air Force roles and responsibilities remained unchanged, except that mention of the field army was stricken in favor of the corps--the 1973 EAD decision--or the phrase "highest Army component employed in a theater of operations," and direct (as opposed to remote) weather support by AWS to Army tactical units (corps, division, separate brigades and regiments) was specified. Research and development would remain essentially an Army job, but the Army added a loophole whereby the Air Force could, by "mutual agreement," perform it for meteorological equipment satisfying "joint Army/Air Force requirements." Words or terms such as tactical, weather modification, and weather satellite support were emphasized more in the Army rewrite, which also added definitions of terms like mesoscale, operational weather support, and direct and remote weather support. Finally, the Army rewrite stressed the need for compatibility between Air Force and Army communications equipment used in weather support.

Rowe's Counter-Proposal

AWS' response, incorporating explicit instructions from Brigadier General Rowe, was shocking: AWS scrapped the Army's rewrite in favor of a counter draft it forwarded that proposed chopping off *all* direct AWS weather support--and Air Force communications and meteorological equipment support--at the corps, and handing the Army the job for *all* such support forward of corps headquarters.[101] AWS weather teams at corps headquarters would make weather support products available to the corps Intelligence officer for dissemination to lower echelons. AWS advocated other changes in the regulation, including an expansion of terms to encompass support to the Army National Guard and Army Reserve forces. While terms like direct and remote weather support were defined, AWS omitted reference to tactical weather satellite or radar support. AWS preferred the Army provide its own weather modification support in "combat areas," but AWS would arrange for airborne weather modification outside the battlefield. Most weather support outlined by AWS in its counter proposal would be tendered on a "common-service" basis. Beyond that, Defense Department directive 4000.19 and other pertinent Army and Air Force directives regarding reimbursement would apply--i.e., the Army would pay for any weather satellite imagery dissemination equipment it wanted for garrison support, and for the weather observer training provided by the Air Force for Army control tower operators and observers. AWS wanted the Army held accountable for the research and development of meteorological equipment *and* techniques for its own people--*and* for AWS personnel if to satisfy "unique" Army requirements. In deference to what Rowe viewed as a key issue, AWS opted for the designation of single contacts within the Army and Air Force for processing Army weather support requirements and coordinating communications programs. Echoing its stand with MAP/SAMSR, AWS also wanted a committee of Army and Air Force general officers established to oversee Army weather support policy and responsibilities. On the topic of weather communications, AWS recommended the status quo insofar as Army installations were concerned; but in the tactical theater of operations, the Air Force would take care of everything down to corps and the Army would be accountable for everything below that echelon. In another striking change, AWS recommended that the Air Force assume responsibility from the Army--and its TOEs--for logistical support of AWS weather teams providing direct support to tactical Army units--which, with Rowe's basic change, meant the corps level and above. Of the alterations recommended by AWS in Army weather support policy, however, none were so impacting as the one to lop off AWS' involvement on the battlefield at corps headquarters.

Informing the MAC commander of his intentions to propose a withdrawal of AWS' direct support back to the corps level, Brigadier General Rowe cautioned that he fully expected to "evoke considerable controversy in AF/PRW and Army channels," but he believed it necessary to get a top-level clarification of responsibilities and resolve "substantial problems" in Army weather support.[102] Major General Collens, the former AWS commander then serving as the MAC chief of staff, believed Rowe's efforts with the joint regulation would "flush out a long-standing argument on how much [the] AF is willing to invest in Army wx spt to fulfill the AF charter"; while the MAC commander's response was "keep me informed."[103]

On 17 January 1978, in forwarding AWS' draft to the Air Staff--AF/PRW--as written, the MAC staff noted that weather support to tactical Army operations--particularly below the corps level--was "inefficient and needs improvement." AWS' counterproposal to the Army's rewrite would more clearly define Army and Air Force roles in the matter. Conflicting points of view would have to be resolved at the Army and Air Staff level, MAC suggested, keeping in mind that manpower assets allocated AWS for Army support were "limited and must be used in the most cost effective manner."[104]

Brigadier General Rowe knew that the change he advocated would elicit considerable controversy. Not only did it turn aside policy evolved from nearly three decades (and three wars) of experience, it had already raised hackles among his staff, his field units, the MAC staff, and with the Air Staff's assistant for weather, Colonel Cummins--AF/PRW. Many on his staff and at MAC were astonished by Rowe's stance, and even after several meetings with some of them the AWS commander would not be dissuaded.[105] The 2d Weather Wing commander's position was that AWDS, which Rowe wanted to place at the corps level *when*--or *if*--it became available to AWS in the 1980s, "will not work in the tactical NATO role,"[106] while the 5th Weather Wing believed that concepts and equipment AWS envisioned for the future should not be cemented into contemporary directives.[107]

Colonel Cummins paid one of his periodic visits to Headquarters AWS in early November 1977. When briefed on Brigadier General Rowe's policy switch, Cummins reacted tepidly. He said he welcomed any effort to develop a policy that would be adhered to by *all* of AWS--reminding AWS officials that the Army's proposed rewrite theoretically reflected AWS "policy," since AWS officers at the headquarters and in the field at USAICS and CACDA and TRADOC collaborated in its formation.[108] With his sudden policy reversal, Rowe put Cummins in an awkward and compromising position with Air Staff contemporaries, and with counterparts at the Department of the Army. "Air Weather Service kind of jumped the track," Cummins said later, adding that Rowe's decision to use the joint regulation rewrite to attract high-level attention was "a very unusual tack."[109] Cummins believed that, reduced to its simplest form, the question at the time was whether the political climate on the Air Staff and at the Department of the Army favored subtle--but necessary--changes in the joint regulation or a major policy alteration in the way the Air Force supported the Army. Not only was Rowe's decision at odds with the direction Cummins favored, but Cummins thought the counter proposal AWS drafted was little less ambiguous than the 1970 version. It sent everybody "back to the drawing board," Cummins concluded, prophesying that it would take years before the Air Staff and the Army could agree to a compromise rewrite of the 1970 edition of the joint regulation.

Rationale: "Trip Wire" For A "Sleeping Giant"

Why? That was the question uppermost in the minds of those most closely associated with weather support to the Army. Why did Brigadier General Rowe decide to propose pulling back AWS support to the corps? There were several reasons. None were so clear cut or preeminent as to provoke a policy reversal by themselves. But taken together they pushed Rowe to the point where he considered all other alternatives barren of substance and hope. They would not help him. They would prove fruitless. Most likely they would compound rather than lay to rest the perennial problems in Army weather support that came to a head during his administration and were an open abcess drawing attention he did not want. His answer to "why," was "why not?"

The change had obviously been fermenting in Brigadier General Rowe's mind when, in mid-1977, the Army formally asked AWS to comment on its MAP/SAMSR implementation plan for the TESS study--which concluded that weather support to the Army was unsatisfactory. About the same time, as addressed in an earlier chapter, the MAC Inspector

General rebuked AWS because the 7th Weather Squadron did not have enough AN/TMQ-22s (tactical meteorological measuring set) to support USAREUR in war. He recommended that AWS stop the Air Force from purchasing more of the unreliable and costly sets ($3,500 apiece), and authorize the reliable, battle-tested, and less-costly ($126.05 apiece) belt weather kit as a substitute. "Where does it say our observers go into the battlefield?" Rowe heatedly responded,[110]

> Let's get on this one vigorously! I want a clear-cut policy that can be understood by MAC/IG, 2WW, 7WW, etc., on how far down in the Army our people will operate. Our equipment requirements will be based on this. Where we have violated the established policy and directives outline for me where we need to change and how best to do it. Prepare policy statement for me to send out to our people and our customers.

While his staff was at work on a policy, General Rowe amplified his beliefs somewhat in August 1977 and furnished some rationale. He was determined to cut direct AWS support off at the EAD corps or division, but would await a staff position on which it should be. It was preferable to cut off support at a specific echelon rather than tell the Army there was no more AWS manpower available to meet its requirements. The "basic guideline is that we're not going to put Air Force blue suiters into combat with the Army," Rowe wrote.* AWS had been "usurping Army prerogatives" by furnishing observations forward of division, "so what we're in right now is a withdrawal from those areas where we've usurped what's really an Army function, observing-wise, and strictly stick to forecasting." "The biggest problem," he continued, "is going to be with our own people, who want to go gung ho in supporting the Army wherever we can do the things they see as needed for support." FALOP observations taken by the Army were "sub-professional," he wrote in agreeing with a position taken by the 2d Weather Wing; but the unattractive alternatives to accepting them--in lieu of automated battlefield sensors--were using AWS observers, which he already ruled out, or the Army's developing a weather career field for enlisted men, followed logically by the creation of an Army Weather Service. "That means that we've got to get off the kick of less than professional," he went on, and decide that "we'll accept it [FALOP] until we can get something better." Addressing the headaches in tactical weather communications, Rowe wrote "let's don't [*sic*] try and cast the Army in an Air Force mode" or "mold"; make do with what the Army provided between corps and division if the decision was to chop direct support off at the division level. Finally, in regard to whether his staff weather

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*In the late 1960s the MAC commander launched a publicity campaign to shore up what he termed "the combat image of MAC." But other than the ARRS effort in Southeast Asia, one of the few things MAC could capitalize on propaganda-wise (there was no way to dress strategic airlift and make it come out as combat) was AWS' "combat weather teams"--as they were referred to then--in Vietnam supporting the Army. The resultant weather team publicity (see Robert P. Everett, "Combat Weather," *Airman*, Vol XIV, No. 1 (Jan70), pp. 13-15) drew Cheshire grins from "grunts" who knew that the occasional sapper attack or mortar barrage on a base camp the weathermen had to put up with was not quite the same "combat" as flushing "Charlie" from his backyard jungle hideouts each day.

officers should be under G-2 (Intelligence) or G-3 (Operations), he reminded them that the Army favored the G-2 so "I think we ought to quit trying to fight it,* and get in bed with the G-2, and make the thing work."[111]

The comprehensive and candid policy review, conducted under the direction of Colonel LeMole's operations staff agency at Headquarters AWS, took the better part of seven months to complete--from May through November 1977. "Army weather support over the years has suffered from many problems," AWS proclaimed; "it too frequently has been relegated to a second class status (importance) by AWS and the AF community and it has not been fully exploited or used by the Army." "Most AWS personnel do not understand real Army weather needs," AWS continued, and there was a "lack of knowledge and a lack of willingness by AWS officers to acquire understanding on the concept of operations for Army forces." "Perhaps one of the major reasons behind our 'problems in Army support,'" AWS hypothesized, "has been our desire to fit the Army into our AWS support mold," and, therefore, AWS attempts at so doing "are doomed to failure." AWS got itself into a manpower squeeze by acquiescing to loopholes in the joint regulation in the beginning, and then furnishing observing support forward of division to the extent that Army requirements inevitably outstripped AWS' assets. AWS support to the Army had to be cost effective; but, in the face of continued manpower cuts levied by MAC and the Air Force, "expansion of Army support may result in decreased services to USAF." AWS was committed to automating the base weather station and its tactical weather support system (the so-called "tactical" AWDS), and "now is the time," AWS concluded, to mesh its centralization and automation concepts with support to tactical Army elements.[112]

After considering the replies from a canvass of the weather wing commanders in October and November 1977,[113]** his staff, through the AWS Council, made the following key recommendations, among others, to

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*Periodically during the early 1970s, as mentioned earlier herein, various elements of AWS, including the 5th Weather Wing and its 16th Weather Squadron, voiced opposition to staff weather officers' having access to Army commanders' staffs through the Intelligence officer rather than the Operations officer as was done in supporting Air Force command. Even the AWS commander, Brig Gen Best, in late 1970, told his staff that "one of the big difficulties [a "long standing problem"] in optimizing operational weather support is that weather is under the G-2 staff element," and he asked what the 5th Weather Wing had done about putting it under G-3 or making it a separate staff agency. (See ltr Col Arthur W. Anderson, ch of staff, HQ AWS, to AWS (DP, *et al.*), "Staff Meeting Actions - 24 September 1970," 24Sep70.

**In reply, the 1st, 3d, and 7th Weather Wings, and AFGWC, basically agreed with the policy proposed by the AWS staff, and offered little substantive comment. [See: msg 1WW (CC) to AWS (CS), "AWS Army Weather Support Policy (Your ltr, 15Nov77)," 281800ZNov77; ltr Col Ronald C. Overby, ch, ops div, 3WW, to AWS (DO), "AWS Army Support Policy," 25Nov77; ltr Col Duane M. Griesbach, ch, ops div, 7WW, to AWS (DO), "AWS Army Support Policy (Your Ltr 15 Nov 77)," 28Nov77; and ltr Col Alphonse Gargiulo, Jr, comdr, AFGWC, to AWS (DO), "AWS Army Support Policy," n.d. (*circa* Nov77).]
As mentioned earlier herein, the 2d Weather Wing did not think AWDS would work in the NATO tactical arena. [Msg 2WW (DO) to AWS (DO), "AWS Army Weather Support Policy (Yr Ltr, 15Nov77)," 281425ZNov77.]

Brig Gen Rowe

Brigadier General Rowe regarding fundamental AWS policy on support to tactical Army forces: Army support would enjoy an equitable share of AWS' resources; AWS would provide forecasting and staff weather officer support down through separate brigades, armored cavalry regiments, and Special Forces bases, but--in deference to Rowe's dictates--AWS observer support would stop at the corps headquarters, and AWS would rely primarily on manual or automated observations taken by the Army from the division forward on the battlefield; AWS would program for all the tactical and fixed meteorological gear needed by its people supporting the Army; and Air Force communications would extend to the corps under AWDS, while the Army would take it from there forward.[114] In essence, the AWS commander went along with his staff's recommendations, with one major exception: Rowe's dictum was that *all* direct AWS and Air Force support to the tactical Army forces would stop at the corps headquarters level. And he saw the offer to comment on the Army's proposed rewrite of the joint regulation as a "trip wire" for formally airing his proposed change to the Air Staff and the Department of the Army.[115]

Another reason for Brigadier General Rowe to make some kind of dramatic move was the shadow cast on his leadership by reports of unsatisfactory AWS support to the Army that kept coming to the attention of the MAC commander, the Air Staff, and high level Army officials.† In early 1976 his staff was admonished by the MAC Inspector General--in a repeat writeup--because the AWS detachment at Fort Bragg did not have enough parachute-qualified people to meet its wartime mobility mission. In November 1976, and again in May 1977, the MAC Inspector General reproved his staff for not providing enough tactical equipment to units supporting the Army. In a report to the MAC commander in May 1976, the Air Force Inspector General charged AWS with providing "passive" support to Army Reserve units.[116] In August 1977, TRADOC's MAP/SAMSR implementation plan for the TESS study proposed corrective measures for overcoming the unsatisfactory weather support to the Army, but AWS spiked it, in effect. In November 1977 his staff formally acknowledged what many had been saying privately: AWS support to the Army was second class. Later that same month, after assessing the weather support to USAREUR while accompanying Rowe on a command visit to 2d Weather Wing units, Rowe's Army liaison officer drafted a report to the Department of the Army that, while laying much of the fault on the

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**(Cont) It also felt that FALOP observations taken by Army personnel would not provide the quality needed by AFGWC to make forecasts, and that support to Army Special Forces envisioned by the AWS staff ("AWS will provide *only* [author's italics] direct forecasting support to the highest Special Forces unit in a theater of operations.") was directly opposite to the position agreed to by AWS field units at a recent conference.

The 5th Weather Wing opposed the idea of incorporating concepts and equipment (AWDS) envisioned for the future into a revised joint regulation that AWS people would have to live with today. (See ltr Col Reams, ch, ops div, 5WW, to AWS (DO), "Army Support," 25Nov77, included as Sup Doc #29 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec77.

†At the same time that the Aerospace Defense Command was complaining about the "totally unacceptable" observing support it was receiving, and the Government Accounting Office was charging AWS with providing costly redundant support to military aviation. See Vol I, *Narrative*, pp.13-22 of *History of Air Weather Service*, (S), 1977. Info used (U).

Army's doorstep, also concluded that AWS support to the Army was unsatisfactory.[117]* Taken by themselves, none of the reports were indicting; but collectively, the scenario they sketched was not propitious. Rowe's best defense, therefore, was a good offense.

So when Brigadier General Rowe informed his boss, the MAC commander, of his intent to propose slicing off direct AWS tactical support at the corps, he confessed it was to overcome "substantial problems" and help reverse the "marginally satisfactory" support AWS was giving the Army.

Another reason the AWS commander cited for his proposal was the conceptual approval--sans funds--the Air Staff granted on 3 November 1977 to AWS' formal petition for AWDS, and the concept that accompanied it for AWDS to terminate at the corps level and be the focal point for tactical Army support. It was a major milestone in AWS' automation and centralization doctrines, and use of the Intelligence officer at the corps to disseminate AWDS-derived information would tie nicely into the Army's increased emphasis on intelligence. "Boy, that plays right into the Air Weather Service game plan," Rowe remarked when informed in October 1975 of Army plans to automate the Intelligence function down to division; "Hell, we could plug right into that thing from Global!"[118]

Progress was slow trying to work the problems through Army and Air Force "channels," Brigadier General Rowe wrote, which was disquieting because, at the same time, he saw trends in evolving Army battlefield doctrine that translated to more AWS support to Army combat units, more AWS manpower, and he did not want his people on the battlefield. As an example, Rowe cited a message from the Army vice chief of staff on 22 November 1977, stressing that, unless weather factors were cranked into weapons systems acquisition and training programs "the Army will find itself unable to fight, survive, and win on the modern battlefield."[119] So, in discussions with the MAC commander's staff, Rowe said he was making his proposal, via the medium of the joint regulation rewrite, to force a dialogue with the Army and focus high-level Army and Air Staff attention on the root problem: meshing spiraling Army requirements for battlefield assistance with AWS' melting manpower.[120] Automation was AWS' solution.

By taking AWDS to corps headquarters, and sweeping the battlefield clean of his people from there forward, Brigadier General Rowe could recoup about 100 of his active duty weathermen, and the 128 in the 200-series Air National Guard weather flights committed to support of divisions in wartime--the MAC commander rapidly and painstakingly pointing it out to the Air Force chief of staff as a "potential for considerable savings."[121] Under pressure from the previous MAC commander to cut his force further, Rowe acceded to Air Staff overtures and, in October 1977, gave his maintenance mission to AFCS at a net

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*After enumerating the causes for inadequate weather support to the Army that were traditionally cited, Swayne sided with Rowe by writing that "the basic problem is that Army weather matters have historically been, and continue to be, addressed by dissociate activities with provincial interests rather than being monitored and directed by a single Army weather manager IAW [In Accordance With] a comprehensive Army weather policy." Swayne recommended that a "single manager for weather" be designated by the Army, and that its "dissociate activities" speak with one voice to a coordinated and comprehensive Army policy on weather support.

savings to the Air Force of 91 spaces;[122] and he admitted that the lure of manpower savings in Army support was equally attractive, an "attention-getting" factor for the Air Staff to ponder while debating his proposal.[123] However, Rowe said it was not the driving factor.

Neither was AWDS. With AWDS becoming a reality, Brigadier General Rowe said, "I could see those problems caused by that distribution of responsibilities in the joint directive magnifying to unmanageable proportion in future years," and so AWDS was a "pacing factor" in his decision to propose the change.[124] Asked if he thought AWS might be out of step because the Army operated in a less centralized and automated structure than did AWS, the AWS commander replied negatively. "They expect to have an automated, highly effective command-and-control system down to . . . corps . . . and I don't think our AWDS concepts are out of step with that at all." "The amount of information that has to be digested by a commander today is so large," Rowe continued, that he needed all the help he could get, and automated data-handling systems gave him that tool.[125]

The two factors that keyed his interest in Army support, Brigadier General Rowe said, were the "importance that I see for weather service to the Army in . . . combat," and "the deficiencies . . . in the ability of our people to do the job."[126]

One such deficiency was weather communications. There were problems with the Army, but Brigadier General Rowe said the "Air Force's skirts . . . [are not] clean on that either," particularly overseas in theaters like Korea and Europe where it was "degraded, if not totally unsatisfactory."[127]

He remained convinced of the need for facsimile forward of corps level in the field. The Army, however, had not recognized the need with the same priority AWS did. "So we have to bastardize, as it were, the equipment supply system to take Air Force weather equipment into a totally Army environment and hang it on Army communications lines," Rowe said. "That's a basic deficiency because we . . . have structured our support--and have been tacitly supported . . . by the Army--in a configuration of centralized production of processed information for use [via facsimile] by our outlying units." The loophole Rowe helped engineer into the joint regulation permitted AWS to haul its facsimile to the field as an "expedient"; but, the general asked hypothetically,[128]

> why don't I use it [the loophole] now? Because I can't afford to follow that route any more. I can't legitimately . . . recommend any longer to my bosses that they spend Air Force money to solve Army problems . . . . I have to get the Army to solve those problems.

In proposing to lop off direct AWS support at the corps, Rowe said he hoped to force the Army to decide if it was going to take facsimile below corps. If they decided against it, and would provide teletype only, then Rowe's reply was that the Army did not need his weathermen below corps because the Intelligence officer at the company or brigade could read weather messages off the teletype just as well as his weathermen. In effect, Rowe said he would leave it up to the Army: if there was not to be facsimile below corps, then there would be none of his weathermen either.[129]

Asked if the indecision evident among Army general officers and their contradictory statements on the need for AWS support affected his decision, Brigadier General Rowe said, no, because until about 1975-76 Army commanders and their staffs, the "Army . . . people that will command and fight the battle," had "bigger problems," "fierce substantive problems," to worry about. Therefore, they left the weather problems to their staff weather officers, which meant that "we probably have been a victim of Air Force solutions to Army problems." [130] After that, Army commanders "with their feet in the fire," such as General Blanchard in Europe at USAREUR, recognized the "absolute necessity" for weather information and have helped "overcome the lethargy . . . at higher levels in the Army structure of the need to begin accounting more seriously for the weather part of the triumverate--enemy, terrain, and weather--that . . . will determine the outcome of future battles." [131] "Timing is fairly important in something like this," Rowe said of his proposal. "And I think the time is right" because "the Army has solved some of these overriding tactics problems" and could now "consider the refinements" like weather support--a so-called "force multiplier, force intensifier" that helped commanders like Blanchard overcome the disadvantage in tanks and troop levels he had. "History may prove me wrong," Rowe offered, "the timing may have been off." [132]

Continuing that trend of thought, Brigadier General Rowe said that in talks with General Blanchard as recently as November 1977 it was apparent that icing on rotary wing aircraft--"a prime combat vehicle"--was a significant problem in the European theater. Yet when he took it upon himself to approach the Army with the problem "I drew a blank"--he was informed by "enclaves" in the Army stateside that the Army did not have problems in that area. "One of these centers [the Army Aviation Center and School at Fort Rucker]," he continued, said [133]

> no, the Army doesn't require something that the field commander said is absolutely necessary. I got caught in that bureaucracy. . . . That's one of the things that really hit me between the eyes . .. that really keyed my thinking to say something's got to be done.

Brigadier General Rowe said he originally tried to tackle such problems through "our liaison structures of officers that live and work with the Army" at USAICS, CACDA, and TRADOC, and "through channels." "But it's not possible," he said, "that's my conclusion, and that's why when the trip wire . . . the joint directive, hit my desk I saw this as an opportunity . . . [to get] some action, [to take "*some dramatic measure*"--author's italics], of overcoming the lethargy or the inability to act." [134] Rowe believed that AWS' staff weather officer and weather liaison structure had not worked "because the Army has had a problem fully integrating that expertise into their system because it belonged to somebody else." Not that he believed the structure had outlived its usefulness, because such officers provided a "vital dialogue" with the Army, furnished AWS feedback on Army trends, and stayed atop issues vital to AWS' interests, such as TOE support for weather teams. But they were not "brushed with brown," Rowe maintained, and they were not "at the level required to influence the kind of policy decisions that were required." "I had reached a point of frustration," Rowe confided, "where I had to admit that I couldn't work the problems through our existing structure." [135]

While on a command visit to his units in Europe in Nov77, during which he discussed weather problems with Gen Blanchard, Brig Gen Rowe tock time out to lunch with some of his enlisted men (pictured here with Amn Larry R. Daugherty) at the Ramstein NCO Club. (USAF Photo)

What was needed, Brigadier General Rowe believed, was "a counterpart focus" in the Army to himself.* "One of the first things . . . that really hit me right head-on when I got this job was the structure of the Army," the AWS commander noted; "the Army is structured in a series of enclaves . . . and centers" so strong and so parochial that neither he nor the AWS liaison structure could permeate them.[136] Rowe evidently never survived the shock when, at the Army's Intelligence Advisory Group meeting at Fort Huachuca in late September 1975, in his initial confrontation with the Army as AWS commander, while still a colonel, CACDA's Major General Brady overrode his position, USAIC's, and the TESS study findings on the need for direct support at division. Rowe

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*One thing Rowe had in mind was an Air Force staff weather officer on the Department of the Army staff, which was somewhat ironic in view of earlier efforts along those lines. One of the action items arising from the initial Army weather support conference in April 1970 was for a staff weather officer to the Department of the Army. Brigadier General Best, the AWS commander, took the matter up with the Air Staff's assistant for weather (AF/PRW), Colonel Louis A, Gazzaniga. Gazzaniga would not hear of it, and the item was tabled. The number-two man in Gazzaniga's shop at the time was Colonel Berry Rowe. See: ltr and 5 atch Lt Col William E. Cummins, II, Ch, Rqmts Val & Func'tnl Spt Div (AWS/AWOORV), DCS Ops, thought that someone was needed "on the Army side to work the problem of policy with, that has basically the same authority" he had. Asked if Mr. Beck was filling that void at the Department of the Army, Rowe said no, because "his authority was no more than just a staff member of the headquarters who had to follow" the chain of command--"he had no ability to cross . . . these lines" of authority in the Army's "enclaves." "It was a step in the right direction," Rowe responded, "but certainly wasn't an answer to the problem." [137]

Brigadier General Rowe was asked if, in his proposed rewrite of the joint regulation, he was aiming for a straightforward, clear-cut directive that totally delineated Army and Air Force responsibilities and roles at each echelon. He said he was not. It was both impractical and undesirable. "An organization is most effective when it's least regulated," he offered. [138] Exorcise the loopholes yes, and clarify basic roles, but leave sufficient elasticity to make it workable.

In summary, while reflecting upon his dramatic proposal to keep AWS weathermen off the battlefield back at corps headquarters, Brigadier General Rowe said he recalled the reaction of Lieutenant Colonel Swayne, the Army liaison officer on his staff: "you may have undertaken something that's awakened a sleeping giant, and you probably are going to get more than you can handle." "I suspect that may be true," the AWS commander concluded. [139]

Postscript

With his proposal, Brigadier General Rowe got the high-level Army attention he wanted. But, inside a year, the waters from the splash he made were once again tranquil, as officials nodded their concern before turning the matter over to the staffing process that studied his ideas to death. None of them became realities. The joint directives were no closer to being revised in 1978 than they were in 1970. Normalcy quickly set back in. Rowe could see signs of it as early as May 1978 when he surprised his staff by announcing his decision to retire late that summer, one year earlier than his mandatory retirement date. Seven months after Rowe retired, his heir designate scrapped his mentor's proposal.

Responding to instructions to keep him informed, Brigadier General Rowe offered some of the rationale for his proposal discussed above, to the MAC commander in chief in a presentation given on 22 February 1978. [140]

Given a green light to proceed, the AWS commander took to the road over the ensuing five months and gave essentially the same pitch to about a dozen Army general officers. Actually, Rowe had already sounded his proposal in the late fall of 1977 with Lieutenant General John H. Cushman at I Corps in Korea, and to General Blanchard at USAREUR. Then in January 1978, during a visit to Headquarters FORSCOM

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*(Cont) HQ AWS, to 1WW, *et al.*, "Army Weather Support Conference," 18May70; and ltr and 13 atch Lt Col Cummins to 1WW, *et al.*, "Second Army Weather Support Conference," 24Feb71.

on the twenty-sixth, he spoke to it with Major Generals John K. Singlaub and Robert Haldane, the chief of staff and deputy chief of staff for operations, respectively. On 1 March Rowe briefed his position to Mr. Beck's boss at the Department of the Army, Major General Edmund R. Thompson, the assistant chief of staff for Intelligence. Rowe followed it up with briefings to Brigadier General James G. Boatner, the commander of the 172d Infantry Brigade at Fort Richardson in early April; to Major General James H. Merryman, the deputy chief of staff for combat development at TRADOC on 1 May; to Lieutenant General John R. Thurman, III, and Brigadier General Fred K. Mahaffey, the commander of the Combined Arms Center, and the deputy commander of CACDA, respectively, at Fort Leavenworth on 19 July; and to Brigadier General Albert N. Stubblebine, III, the USAICS commander at Fort Huachuca the following day. In each instance the generals expressed interest. Thurman went so far as to wire Thompson and Merryman a suggestion to meet and discuss the issues Rowe raised.[141] At FORSCOM, Singlaub and Haldane assured Rowe they were satisfied with the weather service received during stateside maneuvers. "I agreed that if all future wars occurred in the CONUS," Rowe wrote, "I would quit worrying about weather communications and data deficiencies in overseas areas."[142]

In the meantime, the Army Audit Agency issued a report on the Army's meteorological activities. It included an excellent discussion of the Army's requirement for meteorological data during the materiel acquisition process, training, and in combat, and the necessity of instructing Army personnel on the proper use and integration of weather into the planning and decision making processes. It was critical of the Army's management of its meteorological activities, and recommended that a single focal point be designated to oversee them.[143]

To address the deficiencies cited by the Army Audit Agency, and develop a plan for correcting them, the Department of the Army chartered a special meteorological task force. Chaired by Colonel Thomas W. Fuller, from Major General Thompson's Intelligence staff agency at the Department of the Army, the task force held its first meeting from 18 through 24 April 1978, and drafted a plan of action it circulated for review among Army staff agencies and major commands.[144] A second meeting was held during the week of 24 July, after which a revised plan of action was circulated for comment. As 1978 closed, Fuller's shop was incorporating the comments into a final version of the plan, and it had directed the major Army commands to determine the additional manpower and money it would take to implement it. He then planned to convene a conference of general officers before submitting the final plan for consideration by the Army vice chief of staff.

AWS' chief criticism with the drafts it reviewed--a position most of the Army commands echoed--was that it merely reemphasized responsibilities at the various commands without identifying a strong focal point for managing the Army's meteorological resources. Reflecting Brigadier General Rowe's position, AWS recommended that the Intelligence staff agency at the Department of the Army be exclusively earmarked as the focal point for overall meteorological support to the Army, and empowered with the necessary authority to carry out that task.[145]

So on the eve of his retirement, just seven months after formally surfacing his dramatic proposal, Brigadier General Rowe was skeptical that anything positive would result from it. In an end of tour report to the MAC commander in chief, the AWS commander noted heightened interest and a flurry of activity within Army circles. "However," he concluded,[146]

> I have observed similar flurries of activity in the past on this same general subject. The extensive internal Army and Air Force coordination and approval echelons/procedures have been very effective in dampening out such perturbations, protecting vested interests and ultimately returning everything to a peaceful status quo. I already see indications that this same process is beginning. . . . Continuing "Command Interest" in both Air Force and Army channels will be needed to sustain the effort. In my judgment, if deficiencies in this area are allowed to persist, the Army's combat capability will suffer, and Air Force will continue to invest resources in services which won't help the Army win its battles.

Following up on Rowe's point about continued "command interest," the MAC vice commander in chief wrote the Air Staff in December 1978 asking what was holding up action on Rowe's proposed rewrite of the joint regulation. All that could be done was being done, the Air Staff responded, including extensive discussions between the Air Force and Army staffs throughout the spring of 1978. MAC was advised that the Army would be ready to resume discussions in March 1979, once AWS' staff weather officer to TRADOC, Colonel Cummins, presented a proposed position to the Army staff.[147]

Colonel Cummins remained opposed to Rowe's proposal. His carefully worded response to the Department of the Army, through TRADOC, was that the Army should sue for support commensurate with that AWS furnished the Air Force. Translated, it meant that AWS should provide direct support to Army tactical forces below the corps level--a position the Department of the Army conveyed to the Air Staff in early 1979, in yet another proposed rewrite of the joint regulation. Aware of the development, the AWS staff, through the AWS Council,[148] recommended to Colonel Kaehn in March 1979 that AWS overturn Rowe's canon by supporting the Army's position. The AWS commander approved the switch on 17 April 1979.[149] Through 1986, AWS would continue providing direct observing, forecasting, and staff weather officer support to each tactical Army echelon down through divisions, separate brigades, and armored cavalry regiments.

Less than a month later, as a footnote to the saga documented in this study, Chief Master Sergeant George M. Horn, the senior enlisted advisor to the AWS commander, visited 7th Weather Squadron units supporting the Army in Germany. Upon his return, he reported to the AWS staff and commander that the traditional problems in supporting tactical Army elements in the field (outdated directives, poor communications, unsatisfactory TOE and MTOE support, etc.) were beginning to adversely affect the morale of rank and file weathermen trying to make the system work in spite of itself.[150]

CHAPTER 10 - CONCLUSION: ASSETS AND ATTITUDES

For nearly two generations, Army weather support was relegated to second-class status by AWS and by the Air Staff. Many of the problems with supporting the Army were, as two former and very experienced commanders of Army support weather squadrons put it in 1972, directly attributable to the AWS command ethos, which they described as parochial, discriminatory, lethargic, and afflicted with tunnel vision that focused AWS efforts on Army airfields--a microcosm of the total Army mission.[1] According to Colonel Wood, and two of his successors as commander of the 1st Weather Group in Vietnam, it resulted in inadequate support to the Army in combat because Army commanders could not get the type of support they wanted, and did not know how to apply the support AWS was prepared to tender.[2] By the mid-1970s, amidst a time of peace when the military's avowed goal was readiness for war, it resulted in unsatisfactory weather support, if one believed the Army, "marginally satisfactory" support if one believed what the AWS commander told his boss in 1977.

The hurdles to furnishing satisfactory support to the Army in 1978 were, by and large, the same ones that blocked the path for over thirty years. Problems with over-sophisticated field equipment, tactical communications, logistical support, etc., were anything but novelties. Coincidentally, neither were the weather "enclaves" General Rowe referred to within the Army which, while protecting special interests, were stumbling blocks to unified Army policy; or were Army field commanders with too little consciousness of how to convert weather support into a "force multiplier." Neither were Air Staff agencies that mistrusted Army and AWS motives. Neither were ill-trained AWS officers, indifferent about Army support assignments (with apologies here to a very dedicated minority), aware of careers that had so suffocated, and knowing that no one who became "brushed with brown" by wearing khaki and eating C-rations in the trenches with the troops had ever occupied desks in the aerie of the Headquarters AWS command section. Some officers questioned AWS authorities about promotion passovers only to discover that, while the jump wings they wore were impressive, tours at the crossroads of AWS on Offutt or Scott AFBs were more beneficial than tours at Fort Bragg or Fort Campbell.

Generally, they were the same weathermen who helped make the system work in the field, in spite of itself, thereby forming a dichotomy of attitudes in AWS. Scores of post-mortem reports before, and scores of reports from exercises afterward (as well as Vietnam), echoed the words from the Swift Strike III maneuver of 1963 that it was the weathermen's "dogged determination" that held the weather support structure together. They hauled their own teletypes and facsimile machines to the field when the Army would not, or could not, furnish them; and when AFCS would not, or could not, do it for them, they tore Kleinschmidts apart by the light from kerosene lanterns in tents at night in order to get them back in working order for the next morning's operation. Young AWS unit commanders--the lieutenants, the captains, the majors--and their talented enlisted men, jury-rigged a system in the foxholes and made it work year after year, despite doctrinal disagreements at high-level echelons, because of a basic trait in the psychological composition of educated and energetic AWS weathermen: there was a job to do, a boss to serve, and be it a SAC wing or a battalion commander, the AWS unit commander would do it with or without sufficient assets. The grades on his report card depended to a great degree on whether or not he satisfied the tactical commander in the field. That was the motivation for such ambition. And it was human nature that he would do his best in that regard, whether or not he had enough equipment or men. That attitude confronted General Best when AWS was undergoing serious manpower cuts in the early 1970s, and he cautioned his superiors that AWS' customers would complain about degraded service. To make it stick, because he knew what attitude most of his detachment commanders would assume, Best told them he did not want to see them or their men in the weather station between 2200 and 0600 hours if local tactical operations were shut down for those hours. And Best instructed his inspector general, who happened to be Rowe at the time, to look specifically for indications of customer dissatisfaction. But, by and large, with each inspection trip to the field, Rowe came back with reports that the customers were not complaining. Rowe found nothing because AWS detachment commanders tightened their belts to satisfy the customers. Local Army commanders in particular profited by that attitude because, even though they were not fully supporting their weathermen, even though there were not enough weathermen, the weather unit commander somehow managed to shore up the shaky system ehough to please them. Rowe alluded to the fact that the gung ho attitude among his young detachment commanders would be his "biggest problem" in making stick his ukase that there would be no weathermen forward of the corps on the battlefield.

People in Army weather support came and went, but bedrock attitudes lingered. So did the problems, because the attitudes went a long way toward explaining them. And if such psychobiology explained the perpetuity of problems, it also presaged their continued long life because human nature would not vary, and underlying attitudes had not changed much through 1978--notwithstanding discernible ripples on the surface when a tsunami was needed. The problems were concrete, the attitudes abstractions; but until the abstractions were successfully dealt with--and mere papal writs would not absolve them--the problems would go unresolved.

If attitudes went far toward explaining why the same basic problems i Army weather support went unresolved year after year, the "bottom line," to borrow from contemporary idiom, was assets--money, materiel, and men. The assistant deputy chief of staff for operations at Headquarters AWS expressed it best when he concluded in 1976 that progress and cooperation between the Army and Air Force (AWS) in solving those problems "stops when resources are needed." After the heat from combat dissipated, after the dust rose and fell from each year's maneuvers, and after kernals of wisdom were culled from countless studies through the years, it all boiled down to a question of coming up with the wherewithal. Admonitions to be more specific as to requirements were a stratagem AWS and the Air Staff used to screen their inability or unwillingness to fulfill the Army's needs--the evidence being penurious measures each time the Army responded.

Brigadier General Rowe's "sleeping giant" reawoke, not awoke; and it was not in 1975 or 1977, but with the gunfire of Vietnam. As the 1970s dawned, the giant's appetite grew, even amid cries for "peace dividends" by solons bent on rearranging America's social priorities. Rowe helped enact the loopholes through which AWS teased the giant's tastebuds at a time when the Air Staff and MAC were tightening their grip on AWS. Brigadier General Best warned the Air Staff "bean counters," as he referred to them, that trimming AWS would result in customers being unable to digest the degraded service that would result from fewer beans. Rowe, himself, while with AF/PRW in 1971, helped the "bean counters" set the quota for the largest single-year, Air Staff-imposed cut in AWS since post-World War II.[3] By 1977 the carousel had swung full circle and Rowe was the one confronting Best's prophecy come true: the giant was unsatisfied. He wanted more.

By 1977 Brigadier General Rowe felt compelled to react. After seven years of effort, the Army had a comprehensive study, TESS, which concluded that weather support was unsatisfactory and contained a compilation of its specific requirements. It also had a plan, MAP/SAMSR, for overcoming the shortcomings and satisfying its requirements. And it also had a compromise rewrite ready for publication that would bring the bible on Army weather support doctrine up to date. The ball was in Rowe's court. He elected to spurn TESS, spike MAP/SAMSR, and scrap the rewrite in favor of sweeping his men from the battlefield and relying on AWDS at corps.

A major drawback with relying on AWDS in 1977 was that it was a *concept* for the future, as the 5th Weather Wing pointed out, and not something one could apply in the contemporary world to the root causes of unsatisfactory support--attitudes and assets. Granted, the Air Staff approved the concept in November 1977. But it had taken years to reach that plateau (the Air Staff had sent back the basic document for reaccomplishment a couple of times on technicalities), and it was lukewarm to any weather program with a $64 million price tag. So, while the Air Staff had bestowed conceptual approval, it had not earmarked any money for AWDS.

AWDS faced continued tough sledding on the Air Staff. For one thing, AF/PRW believed AWS was diminishing its combat capabilties by going too far too fast with automation and centralization--an ambivalent stance because, at the same time, it was withholding from AWS the extra manpower it would take to meet the Army's growing requirements without resorting to automation and centralization. AWDS was also sophisticated gear, and history suggested it would be a handicap in supporting tactical Army forces.

Then too, AWS was a long way from proving that AFGWC had a role in tactical Army support. Experience with Reforger 76, 77, and 78 demonstrated that use of AFGWC-generated probability forecasts were hardly the "turning point" in AWS history of centralized support to tactical Army operations as they were characterized by Brigadier General Rowe. High speed communication links to nigh-capacity computers at AFGWC, in the bowels of the North American continent, made for a peacetime weather service rivaling the National Weather Service in stature. But AF/PRW's root concern was whether AFGWC's products would be available or of much help to airmen and soldiers on battlefields across the oceans. Like AF/PRW, and many senior officers in AWS, the Army wanted to know what happened when the umbilical cord to AFGWC was severed? Could the "advanced weathermen" manning the corps AWDS go it alone?

Were there any solutions to the problems of assets and attitudes? With regard to the former, probably not. Short of war, and with inflation, defense budgets would always be tight. As part of the Air Force's "tail," AWS would be given barely enough to subsist. The "teeth," the first team tactical and strategic forces, would obviously be seen to first. Caught in logic's crossfire between the immovable wall (the Air Staff's refusal to either allocate more assets or abrogate the mission) and the irresistible object (expanding Army requirements), AWS had no choice but to walk a tightrope between what it wanted to do, by way of supporting the Army, and what it could do with the assets at hand.

Neither could AWS solve the attitude problem with the Army. It could, however, redress its own. It would seem that it could foster a hard core of officers and enlisted weathermen who would spend most of their careers in Army weather support.

Admittedly, many details would have to be worked out that are beyond the purview of this work. The infrastructure exists. But a course should be charted in the Army weather support specialty for young officers, portraying normal career progression that is competitive with their peers supporting Air Force units to the point where it could conceivably culminate as the O-7 commander of AWS. Only then would bedrock attitudes in AWS change for the better, top to bottom.

There appears to be no overriding reason for not so doing. Experts in Army weather support need no longer feel or be treated like step-children in the AWS "family." Morale would improve because attitudes would change. And weather support to the Army would no longer be characterized as second class, or unsatisfactory, or "marginally satisfactory."

Footnotes

CHAPTER 1 - PRE VIETNAM

[1] "History of the Air Weather Service," Jan-Jun52 (S), pp. 273-83. Info used (U).

[2] *Ibid.*

[3] AWS Historical Study #4, *History of Weather Support to the United States Army*, Dec58, included as Chap X to "History of the Air Weather Service," Jul-Dec58 (S). Info used (U).

[4] See: Section IV, "Agreements on Organization, Mobilization and Training Functions," p. 13, of "Army - Air Force Agreements as to the Initial Implementation of the National Security Act of 1947," 15Sep47; and memo and atch--memorandum of agreements, Maj Gen Earle E. Partridge (Asst Ch of Air Staff-3) and Lt Gen C. P. Hall (Director of Org and Training, Dept of Army), "Agreement on Air and Army Positions for Separation of Air Force and Army," 16Sep47--Lt Gen J. Lawton Collins, Dep Ch of Staff, War Dept, to Directors of War Dept General Staff Divs, *et al.*, "Separation of the Air Force from the U.S. Army," 16Sep47--included as Sup Doc #1 in Vol II, "Supporting Documents," of this study.

[5] AWS Historical Study #4, *History of Weather Support to the United States Army*, Dec58.

[6] See AFM 105-6, *Weather Service for Military Agencies*, 20Dec56, included as Sup Doc F in "History of the Air Weather Service," Jan-Jun57, (S). Info used (U).

The doctrine of AFM 105-6 formed the basis for a manual published by the 2d Weather Group in August 1957, entitled *Weather Support to Tactical Forces*, a copy of which is on file in the AWS historical archives.

[7] AWSR 55-56, "Operations: Weather Service for Army Units," 15Oct57, included as Sup Doc #26 in Vol II, "Documents," of "History of Air Weather Service," Jul-Dec58 (S). Info used (U). The Oct57 version of AWSR 55-56 was superseded by updated version of 16Oct59 which is on file in the AWS historical archives.

[8] AWS Historical Study #4, *History of Weather Support to the United States Army* Dec58, pp. 280-82.

[9] *Ibid.*, pp. 364, 385-89.

[10] *Ibid.*

[11] See, for example, ltr Col T. J. Marnane, Adjutant General, USCONARC (ATINT 413.6/61), to All ZI Armies, *et al.*, "Meteorological Requirements of the US Army," 2Jun59, on file in AWS historical archives.

[12] AWS Historical Study #4, *History of Weather Support to the United States Army*, Dec58, pp. 363, 367-77.

[13]*Ibid.*, and "History of the Air Weather Service," Jan-Jun59 (S), pp. 3-9. Info used (U).

[14]See CONARC Reg 115-1, "Hydrological and Meteorological Services: Air Weather Service Support for the Army Within CONUS," 1Mar61, on file in the AWS historical archives.

[15]AR 115-10/AFR 105-3, "Hydrological and Meteorological Services: Meteorological Support for the U.S. Army," 23Mar62, pp. 1-2, included as Sup Doc #2 in Vol II, "Supporting Documents," of this study.

[16]*Ibid.*, 11.

[17]*Ibid.*, 4-5.

[18]*Ibid.*, 5-6.

[19]*Ibid.*, 4-5

[20]Change 1 to AR 115-10/AFR 105-3, 19May65, included as Sup Doc #3 in Vol II, "Supporting Documents," of this study.

[21]See AFM 2-31, *Aerospace Operational Doctrine: Aerospace Environmental Operations*, 17Dec65, pp. 11-12, included as Sup Doc #5 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul64-30Jun65 (S). Info used (U).

[22]Lt Col Herbert J. Kay (Army Artillery), Chief Evaluator, "Report of Troops Test Evaluation of Air Weather Service Organization in Support of the Army at Corps and Division Level," Project No. USA CDCAVNA 64T1, 30Aug63, p. 5, available in the AWS historical archives.

[23]*Ibid.*, 9-10.

CHAPTER 2 - THE TET OFFENSIVE - 1968

[1]Fuller and Maj Allan B. Milloy, Vol I, *Narrative*, (S), pp. 40-42, 457, of *The Air Weather Service in Southeast Asia* (Scott AFB IL: HQ Air Weather Service, 15Nov68). Info used (U).

[2]*Ibid.*, 458-59.

[3]*Ibid.*

[4]*Ibid.*, 460.

[5]*Ibid.*, 411-12.

[6]*Ibid.*, 443-44.

[7]*Ibid.*, 389-94, 443-44.

[8]Ltr Fuller to MAC (XOZT), "Historical Spt for Analysis of AWS Wartime Reqmts," 18May77.

[9]Fuller and Milloy, Vol I, *Narrative*, (S), pp. 250-54, 259-60, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[10]Ltr Col Arthur W. Anderson, AWS ch of stf , to MET-1, "US Army Requirement for Direct Weather Service," 26Mar68.

[11]"History of the 30th Weather Squadron," Jan-Jun66, p. 14, included as Appendix 2 to "History of the 1st Weather Wing," Jan-Jun66.

[12]*Ibid.*, pp. 16-18. See also A/2C Henry C. Jackson, "Vietnam Detachment Gives Tactical Support to Airmobile Di[illegible]on," *Observer* (Jun66), p. 5; SSgt Steward Diamond, "Two-Man Detachment Backs Combat Pilots," *Observer* (Feb66), p. 3; and "Vietnam Service Earns Medals for Captain Hill," *Observer* (Jan67), p. 5.

[13]Lt Gen Bernard William Rogers, U.S. Army, *Cedar Falls-Junction City: A Turning Point,* from *Vietnam Studies* (Wash DC: Dept of the Army, 1974), p. 83.

[14]Fuller and Milloy, Vol I, *Narrative*, (S), pp. 468-69, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U). See also "History of the 1st Weather Group," Jul-Dec66, pp. 13-14, 40-43, included as Appendix 1 to "History of the 1st Weather Wing," Jul-Dec66.

[15]U.S., Congress, House, Committee on Armed Services, *Hearings on Military Posture . . .*, 91st Cong, 1st Sess, Pt 2, 1969, pp. 3,857-58.

[16]Lt Gen Willard Pearson, U.S. Army, *The War in the Northern Provinces: 1966-1968*, from *Vietnam Studies* (Wash, DC: Dept of the Army, 1975), pp. 37-39; Lt Gen John J. Tolson, U.S. Army, *Airmobility: 1961-1971*, from *Vietnam Studies* (Wash, DC: Dept of the Army, 1973), p. 158; Gen William C. Westmoreland, "Report on Operations in South Vietnam, January 1964-June 1968," in *Report on the War in Vietnam* (Wash, DC: US Govt Printing Office, 1969), pp. 157-58; and Gen William C. Westmoreland, *A Soldier Reports* (Garden City, NY: Doubleday & Co, 1976), pp. 377-99.

[17]Pearson, *The War in the Northern Provinces: 1966-1968*, pp. 39-42; Tolson, *Airmobility: 1961-1971*, pp. 162-63; Westmoreland, "Report on Operations in South Vietnam, January 1964-June 1968," pp. 159-60; and Westmoreland, *A Soldier Reports*, pp. 400-01.

[18]*Ibid.*

[19]Pearson, *The War in the Northern Provinces: 1961-1968*, p. 43.

[20]Tolson, *Airmobility: 1961-1971*, p. 163.

[21]Pearson, *The War in the Northern Provinces: 1961-1968*, pp. 47-48; Westmoreland, "Report on Operations in South Vietnam, January 1964-June 1968," p. 160; and Westmoreland, *A Soldier Reports*, p. 402.

[22]Brig Gen Edwin H. Simmons, USMC Ret, "Marine Corps Operations in Vietnam, 1968," in *The Marines in Vietnam, 1954 - 1973: An Anthology and Annotated Bibliography* (Wash, DC: History and Museums Div, HQ U.S. Marine Corps, 1974), p. 101.

[23]U.S., Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1969*, 90th Cong, 2d Sess, Pt 1, 1968, p. 55. See also Westmoreland, *A Soldier Reports*, pp. 407-08.

[24]Westmoreland, "Report on Operations in South Vietnam, January 1964-June 1968," pp. 162-63.

[25]Westmoreland, *A Soldier Reports*, p. 410.

[26]Maj Gen Burl W. McLaughlin, USAF, "Khe Sanh: Keeping an Outpost Alive," *Air University Review*, Vol XX, No 1 (Nov-Dec68), pp. 57-77.

[27]U.S., Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1969*, 90th Cong, 2d Sess, Pt 4, 1968, pp. 1,006-07.

[28]Capt Moyers S. Shore, II, USMC, *The Battle for Khe Sanh* (Wash DC: Historical Br, G-3 Div, HQ U.S. Marine Corps, 1969), pp. 72-74.

[29]*Ibid.*; Pearson, *The War in the Northern Provinces: 1966-1968*, p. 77.

[30]Shore, *The Battle for Khe Sanh*, pp. 72-74; U.S. Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1969*, 90th Cong, 2d Sess, Pt 4, 1968, pp. 1,006-07.

The latter source indicated that during the 73-day siege at Khe Sanh, Air Force aircraft expended nearly 750,000 rounds of ammunition and dropped more than 72,000 tons of bombs--12,500 tons from tactical fighter-bomber aircraft and 59,500 tons from B-52s. Air Force tactical aircraft flew a total of 9,691 sorties and B-52s contributed 2,548 sorties. Coupled with 1,398 Air Force reconnaissance and 1,598 Air Force FAC (Forward Air Controller) sorties, total strike and strike supporting sorties amounted to 27,650, including 5,337 Navy and 7,078 Marine sorties.

For official unclassified Air Force accounts of that, the greatest sustained concentration of air power in Vietnam to that time, see: Bernard C. Nalty, *Air Power and the Fight for Khe Sanh* (Wash DC: Office of Air Force History, HQ USAF, 1973); Jack S. Ballard, *et al.*, *The United States Air Force in Southeast Asia, 1961-1973: An Illustrated Account*, ed. Carl Berger (Wash DC: Office of Air Force History, HQ USAF, 1977); and Gen William W. Momyer, USAF Ret, *Air Power in Three Wars* (Wash DC: Office of Air Force History, HQ USAF, 1978).

Aviation Week & Space Technology (Cecil Brownlow, "B-52s Prove Tactical Value During Siege of Khe Sanh," 13May68, pp. 26-30) noted that the combined ordnance dropped by Air Force, Navy, and Marine aircraft at Khe Sanh was approximately one-sixth of all that expended by the Air Force during three years of the Korean War. *Time* magazine ("How the Battle for Khe Sanh was Won," 19Apr68, pp. 30-32), noting that "U.S. airmen enclosed the besieged fortress in a virtual curtain of falling bombs," presumptuously labeled Khe Sanh as "a landmark in the use of airpower in warfare--the first time that aerial bombardment has denied an attacker the ability to assault his target."

[31]Westmoreland, *A Soldier Reports*, p. 421.

[32]Tolson, *Airmobility: 1961 - 1971*, p. 174.

[33]*Ibid.*, pp. 179-80.

[34]Nalty, *Air Power and the Fight for Khe Sanh*, pp. 100, 103; and Westmoreland, *A Soldier Reports*, p. 422.

[35]Westmoreland, *A Soldier Reports*, p. 423.

[36]*Ibid.*, p. 422; Tolson, *Airmobility: 1961 - 1971*, pp. 178, 182; Pearson, *The War in the Northern Provinces: 1961-1968*, p. 89; and Westmoreland, "Report on Operations in South Vietnam, January 1964 - June 1968," p. 165.

[37]Telephone interview by author on 2Aug79 with Lt Gen Tolson, U.S. Army, retired.

[38]Tolson, *Airmobility: 1961 - 1971*, pp. 183-85.

[39]*Ibid.*, p. 186.

[40]*Ibid.* pp. 186-87.

[41] *Ibid.*, p. 188. [42] *Ibid.*, pp. 19-91.

[43] *Ibid.*; and Pearson, *The War in the Northern Provinces: 1961 - 1968*, p. 92.

[44] Westmoreland, "Report on Operations in South Vietnam, January 1964 - June 1968," p. 288.

It was interesting that, while the accounts published by Generals Westmoreland, Pearson, and Tolson were liberally sprinkled with enemy casualty figures, they rarely contained statistics on American casualties.

[45] Tolson, *Airmobility: 1961 - 1971*, p. 191. No helicopters were lost during operation Pegasus.

[46] Interview by author on 6Jun74 with Lt Col (colonel-select) Peter N. Micale; telephone interview by author on 25Jun79 with Col Micale.

[47] Tolson, *Airmobility: 1961 - 1971*, pp. 191-92.

[48] Westmoreland, *A Soldier Reports*, p. 424.

[49] Pearson, *The War in the Northern Provinces: 1961 - 1968*, p. 101.

[50] Westmoreland, *A Soldier Reports*, p. 403.

[51] Westmoreland, "Report on Operations in South Vietnam, January 1964 - June 1968," pp. 161, 168, and 190-91.

[52] Johnson, *The Vantage Point: Perspectives of the Presidency, 1963-1969* (New York: Holt, Rinehart and Winston, 1971), pp. 382-83.

[53] Westmoreland, *A Soldier Reports*, p. 406.

[54] Samuel Eliot Morison, Henry Steele Commager, and William E. Leuchtenburg, *A Concise History of the American Republic* (New York: Oxford University Press, 1977), pp. 734-38.

[55] Johnson, *The Vantage Point*, pp. 365-424.

[56] Memo Fuller to Mr. Charles W. Dickens, MAC historian, "'Tactical Airlift in SEA' Draft," 30Sep75; interview by author on 12May75 with Col Edwin E. Carmell, vice comdr, AWS (who was 1st Weather Group vice commander from 1Mar to 21Jul67, after which he commanded the group until 14Jan68); and telephone interview by author on 28Jun79 with Col Juri Nou, 1WS, MacDill AFB, FL (who was the 1st Weather Group's scientific services officer during the Tet offensive).

[57] Vol II, "U.S. Ground Strategy and Force Deployments: 1965-1967," Bk 5 of 12 books of *United States - Vietnam Relations, 1945-1967: Study Prepared by the Department of Defense* (Wash DC: U.S. Government Printing Office, 1971), pp. 50-51 (these books were one version of the so-called *Pentagon Papers*); U.S., Congress, Senate, Subcommittee on Oceans and International Environment of the Committee on Foreign Relations, *Hearings: Weather Modification*, 93d Cong, 2d Sess, 1974, pp. 88-89. The latter document is hereinafter cited as *Senate Weather Modification Hearings, 1974*.

[58]Interview by author on 12May75 with Col Carmell; *Senate Weather Modification Hearings*, 1974, pp. 92-103.

[59]*Ibid.*

[60]Westmoreland, *A Soldier Reports*, p. 342. See also Ted Szulc, *The Illusion of Peace: Foreign Policy in the Nixon Years* (New York: The Viking Press, 1978), p. 39.

[61]*Senate Weather Modification Hearings, 1974*, pp. 108-16.

[62]Only four members of Congress knew: the chairmen of the House and Senate Armed Services and Appropriations committees.

[63]Interview by author on 12May75 with Carmell.

[64]Telephone interview by author on 2Aug79 with Tolson.

[65]Referred to through the years as the Southeast Asia Tactical Forecast Center, the Southeast Asia Forecast Center, and the Southeast Asia Weather Center.

[66]Ltr Lt Col Leroy P. Brunner, comdr, Det 14, 1WG, to 1WG (G1C), "Activities Report, January 1968," 10Feb68.

[67]Capt D. D. Cain, forecaster, Det 14, 1WG, "End of Tour Report," 13Mar69, pp. 1, 5, included as Tab 40 of Fuller, ed., "End of Tour Reports," 15Apr70.

[68]Msg 1WG (G1OC) to 1WW (OC) and Det 9, 30WS, info Det 14 1WG and 30WS, "Forecast for Khe Sanh in Bulletin KTVM VVSD," 121000ZFeb68.

[69]Msg 1WW (OC) to 1WG (G1OC), info AWS (AWOSYC), "Cancellation of Data Requirements," 310330ZJul68.

[70]"History of Detachment 14, 1st Weather Group," Jan-Jun68, included as Annex A to "History of the 1st Weather Group," Jan-Jun68, itself included in Vol II of "History of the 1st Weather Wing," Jan-Jun68.

[71]Capt Wade V. Hilton, current ops officer, HQ 1WG, "SEA End of Tour Report," p. 5, included as Tab 42 of Fuller, ed., "End of Tour Reports," 15Apr70.

[72]Ltr and atch Maj Tommy D. Guest, ops officer, 30WS, to 30WS comdr, "End of Tour Report," 17Oct68, included as Tab 25 of Fuller, ed., "End of Tour Reports," 15Apr70; telephone interview by author on 28Jun79 with Col Guest, vice commander, 3d Weather Wing, Offutt AFB, NE.

[73]Maj Micale, ops officer, 5WS, "SEA End of Tour Report," p. 5, included as Tab 33 of Fuller, ed., "End of Tour Reports," 15Apr70.

[74]Ltr Capt Taylor, comdr OL-2, Det 31, 5WS, to 1WG (G1OP), "End of Tour Reports," 20Nov68, p. 1, included as Tab 29 of Fuller, ed., "End of Tour Reports," 15Apr70.

[75]Telephone interview by author on 22Jun79 with Col (USAF ret) William H. Shivar.

[76]*Ibid.*

[77]Telephone interview by author on 19Jun79 with Maj Thomas E. Taylor, Svcs Div (MAC/IGIS), Directorate of Inspection, MAC Inspector General, HQ MAC.

[78]*Ibid.*

[79]Telephone interview by author on 25Jun79 with Col Micale.

[80]Ltr Capt Taylor to 1WG (G1OP), "End of Tour Report," 20Nov68.

[81]See ltr Col Wood, comdr, 1WG, to Col Lowell A. Stiles, comdr, 1WW, "Activity Report (No 3)," 31Jul68.

[82]Ltr Capt Taylor to 1WG (G1OP), "End of Tour Report," 20Nov68; telephone interview by author on 19Jun79 with Maj Taylor.

[83]*Ibid.*

[84]*Ibid.*

[85]Telephone interview by author on 25Jun79 with Col Micale.

[86]Telephone interview by author on 19Jun79 with Maj Taylor.

[87]Fuller and Milloy, Vol I, *Narrative* (S), pp. 200-01, 363-64, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[88]Telephone interview by author on 19Jun79 with Maj Taylor.

[89]Interview by author on 12May75 with Col Carmell. Carmell subsequently rose to the position of vice commander in AWS, from which he retired in 1975.

[90]Ltr Col Wood to Aerospace Studies Institute (ASD-1R), Air University, "Project Corona Harvest End-of-Tour Report," 12Jan69, included as Tab 37 of Fuller, ed., "End of Tour Reports," 15Apr70.

[91]Interview by author on 12May75 with Col Carmell.

[92]*Ibid.*

[93]*Ibid.*

[94]"History of Detachment 14, 1st Weather Group," Jan-Jun68, p. 7, included as Annex A to "History of the 1st Weather Group," Jan-Jun68--itself included in Vol II of "History of the 1st Weather Wing," Jan-Jun68.

[95]1WW, *Weather Evaluation Southeast Asia Operations: February 1968*, p. 23; 1WW, *Weather Evaluation Southeast Asia Operations: March 1968*, p. 26; and 1WW, *Weather Evaluation Southeast Asia Operations: April 1968*, p. 23.

[96]Interview by author on 12May75 with Col Carmell.

[97]Ltr Col Ray L. Bowers, ch, Special Histories Branch, Office of Air Force History, HQ USAF, to Fuller, 4Feb76. Bowers, a C-130 navigator in South Vietnam in 1967-68, authored the Air Force's official history of tactical airlift in Southeast Asia--a well researched and definitive account yet in coordination at this writing. A condensation of his effort, "Tactical Airlift," can be found in Ballard, *et al.*, *The United States Air Force in Southeast Asia, 1961-1973: An Illustrated Account*, ed. Berger (Wash DC: Office of Air Force History, HQ USAF, 1977), pp. 169-85.

97(Cont) For a good account of Air Force airlift operations into Khe Sanh in 1968, and weather effects thereupon, see McLaughlin, "Khe Sanh: Keeping an Outpost Alive," *Air University Review*, Vol XX, No 1 (Nov-Dec68), pp. 57-77. Maj Gen McLaughlin commanded the 834th Air Division in South Vietnam, and it was his C-123s and C-130s that flew into Khe Sanh.

98Capt Harold E. Headless, ops officer, Det 14, 1WG, 13Jun67 to 18Jun68, "Corona Harvest Questionnaire," n.d., included as pp. 43-44 of Maj Milloy, "Corona Harvest Questionnaires," 24Feb69, itself included as Sup Doc #78 in Vol II, "Supporting Documents," of Fuller and Milloy, *The Air Weather Service in Southeast Asia*, 15Nov68.

99Ltr Lt Col Leroy P. Brunner, comdr, Det 14, 1WG, to 1WG (G1C), "Activities Report, January 1968," 10Feb68. See also: Capt D.D. Cain, fcstr, Det 14, 1WG, "End of Tour Report," 13Mar69, p. 2; ltr Capt Charles E. Schulze, Jr, fcstr, Det 14, 1WG, to comdr, Det 14, 1WG, "End of Tour Report," 4Apr69, p. 4; Capt Charles G. Bejin, fcstr, Det 14, 1WG, "SEA End of Tour Report," n.d., pp. 1, 3; and Maj Castor Mendez-Vigo, Jr, ops officer, Det 14, 1WG, "SEA End of Tour Report," n.d.--included, respectively, as Tabs 40, 45, 49, and 59 of Fuller, ed., "End of Tour Reports," 15Apr70.

100Maj Gen Joseph A. McChristian, U.S. Army, *The Role of Military Intelligence: 1965-67*, from *Vietnam Studies* (Wash DC: Dept of the Army, 1974), p. 6.

101 1WW Recurring Pub 190-1, *Pacmet*, No. 6 (Jun68), p. 1.

102Ltr Capt Charles E. Schulze, Jr, fcstr, Det 14, 1WG, to comdr, Det 14, 1WG, "End of Tour Report," 4Apr69, included as Tab 45 of Fuller, ed., "End of Tour Reports," 15Apr70.

103Interview by author on 12May75 with Col Carmell.

104Ltr Col Wood, comdr, 1WG, to Aerospace Studies Institute (ASD-1R), Air University, "Project Corona Harvest End-of-Tour Report," 12Jan69; Maj Mendez-Vigo, Jr, ops officer, Det 14, 1WG, "SEA End of Tour Report," n.d.--included, respectively, as Tabs 37 and 59 of Fuller, ed., "End of Tour Reports," 15Apr70.

105Telephone interview by author on 22Jun79 with Lt Col Shivar; Capt Larry E. Nye, asst ops off, HQ 5WS, "SEA End of Tour Report," n.d., included as Tab 72 of Fuller, ed., "End of Tour Reports," 15Apr70.

106Ltr and atch Lt Col William C. Meyer, ch, ops div, 1WG, to 1WG Units Participating in PEP, "PEP Results," 23Apr68; and ltr Maj Micale, ops off, 5WS, to 1WG (GIOVC), "Product Evaluation Program," 11Oct68.

107Capt Clifford J. Sturek, comdr, Det 8, 5WS (Vung Tau Army Installation), "SEA End of Tour Report," n.d.; Capt Paul W. Quade, comdr, Det 11, 5WS (Vinh Long Army Installation), "SEA End of Tour Report," n.d.--included, respectively, as Tabs 38 and 44 of Fuller, ed., "End of Tour Reports," 15Apr70.

108 Capt Daniel R. Gornell, comdr, Det 32, 5WS, "End of Tour Report,"n.d., included as Tab 36 of Fuller, ed. "End of Tour Reports," 15Apr70.

109 Capt Gerald W. Dockall, comdr, Det 31, 5WS, "End of Tour Report," n.d., included as Tab 31 of Fuller, ed., "End of Tour Reports," 15Apr70.

110 Telephone interview by author on 19Jun79 with Maj Herbert Weigl, Jr, who was staff weather officer to the 1st Infantry Division from June 1967 to January 1969.

111 Telephone interview by author on 19Jun79 with Maj Taylor.

112 Telephone interview by author on 21Jun79 with Maj James P. Reilly, Air Force Global Weather Central, Offutt AFB, NE.

113 Telephone interview by author on 2Aug79 with Tolson.

114 Telephone interviews by author on 22Jun79 with Col (USAF ret) Shivar, and on 25Jun79 with Col Micale.

115 "History of the 5th Weather Squadron," Jan-Jun68, p. 5, included as Annex C to "History of the 1st Weather Group," Jan-Jun68, itself included as Vol II of "History of the 1st Weather Wing," Jan-Jun68.

116 Ltr Lt Col Shivar, comdr, 5WS, to HQ USARV (Signal officer), "Weather Teletype Communications Effectiveness," 25Mar68.

117 Capt Walter B. Bauer, comm off, 1WG, 4Dec67 to 20Nov68, "End of Tour Report," n.d., included as Tab 28 of Fuller, ed., "End of Tour Reports," 15Apr70.

118 Ltr Capt Taylor to 1WG (G1OP), "End of Tour Report," 20Nov68; and telephone interview by author on 19Jun79 with Maj Taylor.

119 Ltr Lt Col William A. Beczkalo, ops off, 5WS, to 1WG (G1O), "5th Weather Squadron Weather Communications," 27Jan68; and ltr Col Griffin H. Wood, comdr, 1WG, to 7AF (DE), "Emergency Communications Request-Camp Evans," 1Feb68.

120 "History of the 1st Weather Group," Jan-Jun68, p. 5, included as Vol II of "History of the 1st Weather Wing," Jan-Jun68.

121 Memo for record, Capt Walter B. Bauer, comm off, 1WG, "Pending Circuits for 5 Wea Sq Units," 26Sep68.

122 Ltr and 2 atch Lt Col Meyer, ch, ops div, 1WG, to All 1WG Units (OLs) (Less Det 34), "Surface Observation and Forecast Bulletins-Vietnam," 19May68.

123 Telephone interview by author on 16Apr80 with Lt Col Ronald W. Clarke, then stationed at Langley AFB, VA. See also Capt Clarke, comdr, OL-4, Det 32, 5WS, "End of Tour Summary of Communications and Supply Support," n.d., included as Tab 32 of Fuller, ed., "End of Tour Reports," 15Apr70.

124 *Ibid.*

[125]Ltr and 5 atch Lt Col Shivar, comdr, 5WS, to 1WG, "Support for Weather Teams Providing Service to Army Forces," 25Jun68; and ltr and 7 atch Col C. John Loisel, vice comdr, 1WG, to 1WW, "Support for Weather Teams Providing Service to Army Forces," n.d. (*circa* 15Aug68).

[126]"History of the 5th Weather Squadron," Jan-Jun68, pp. 6-7, included as Annex C to "History of the 1st Weather Group," Jan-Jun68, itself included as Vol II of "History of the 1st Weather Wing," Jan-Jun68.

[127]Telephone interview by author on 19Jun79 with Maj Taylor.

[128]"History of the 5th Weather Squadron," Jan-Jun68, p. 6, included as Annex C to "History of the 1st Weather Group," Jan-Jun68, itself included as Vol II of "History of the 1st Weather Wing," Jan-Jun68.

[129]Telephone interviews by the author on 22Jun79 with Lt Col (USAF ret) Shivar, and on 25Jun79 with Col Micale.

[130]Ltr and 5 atch Lt Col Shivar, comdr, 5WS, to 1WG (G1C), "Activities Report, January 1968," 6Feb68; ltr and atch Lt Col Arthur L. Warren, Jr, comdr, 10WS, to 1WG (G1C), "Activities Report, January 1968," 7Feb68; and "History of the 5th Weather Squadron," Jan-Jun68, pp. 1-9, included as Annex C to "History of the 1st Weather Group," Jan-Jun68, itself included as Vol II to "History of the 1st Weather Wing," Jan-Jun68.

[131]*Ibid.*

[132]Ltr Capt Bauer, comm off, 1WG, to 1WG (G1O, G1CV, and G1C), "30 Wea Sq Activities Letter, Nov67," 12Jan68; and ltr Capt Thomas J. Cody, comdr, Det 9, 30WS (Da Nang), to 1MAW (Marine Aircraft Wg--G-3), "Khe Sanh Weather Observations," 20Jan68.

[133]Memo for record, Capt Bauer, comm off, 1WG, "Teletype Communications for Khe Sanh," 16Mar68.

[134]Memo for record, Capt Bauer, "Relay of Khe Sanh through Thailand," 26Feb68.

[135]Msg 1WG (G1OC) to 2WS (Ops), info 1WW (OC), AWS (AWOSYC), and 3WW (OC), "Khe Sanh Hourly Observations," 051205ZApr68; msg USMACV (MACJ205) to Comdg Gen III MAF and 7AF (DE), info 1MAW (CO), *et al.*, "Khe Sanh Weather Observations," 271100ZApr68; msg 7AF (DE) to USMACV (MACJ205), info Comdg Gen III MAF, *et al.*, "Khe Sanh Weather Observations," 081100ZMay68; and msg USMACV (MACVJ205) to Comdg Gen III MAF, info 1MAW (CO), *et al.*, "Khe Sanh Weather Observations," 121000ZMay68.

[136]Ltr Lt Col Gordon W. Schmal, comdr, 30WS, to 1WG (G1C), "End of Tour Report," 20Jun68, included as Tab 19 of Fuller, ed, "End of Tour Reports," 15Apr70.

[137]Telephone interview by author on 19Jun79 with Maj Taylor; Maj Micale, "SEA End of Tour Report," p. 3, included as Tab 33 of Fuller, ed., "End of Tour Reports," 15Apr70.

[138] *Ibid.*

[139] *Ibid.*

[140] "AWS NCO Reminisces Vietnam Experiences," *Observer*, Vol 16, No. 2 (Feb69), p. 2.

[141] *Ibid.*; ltr and atch Maj Guest, ops off, 30WS, to 30WS comdr, "End of Tour Report," 17Oct68, included as Tab 25 of Fuller, ed., "End of Tour Reports," 15Apr70.

[142] Micale, "SEA End of Tour Report," p. 3, included as Tab 33 of Fuller, ed., "End of Tour Reports," 15Apr70. In a telephone interview with the author on 25Jun79, Micale continued to believe there was no requirement for weather observers at brigade level.

[143] See, for instance, Capt Wade V. Hilton, current ops off, 1WG, 4Feb68 to 4Feb69, "End of Tour Report," included as Tab 42 of Fuller, ed., "End of Tour Reports," 15Apr70.

[144] Telephone interview by author on 19Jun79 with Maj Taylor.

[145] Ltr Lt Col Brunner, comdr, Det 14, 1WG, to 1WG (G1C), "Activities Report, January 1968," 10Feb68.

[146] Interview by author on 12May75 with Col Carmell.

[147] Ltr and 5 atch Lt Col Shivar, comdr, 5WS, to 1WG (G1C), "Activities Report, January 1968," 6Feb68.

[148] "War Zone Reports: Weathermen Cited for Bravery," *Air Force Times*, 15May68, p. 17; telephone interview by author on 18Apr80 with CMSgt Larry D. Scoggins, HQ 5WW, Langley AFB, VA.

[149] "History of the 1st Weather Group," Jan-Jun68, p. 11, included as Vol II of "History of the 1st Weather Wing," Jan-Jun68.

[150] Msg 377CSG (BDPMP) to USAFMPC (AFPMSC), info PACAF (DPSP), *et al.*, "Casualty, Message, Initial Death Report, Battle," 040830ZMar68; msg 61MAW (61PDAR) to CSAF (AFPMSC) and USAFMPC (AFPMSCA), info CINCPACAF (DPSP), *et al.*, "Casualty Message, Supplementary Death Report, Battle," 050154ZMar68; msg 377CSG (BDPMP) to CSAF, USAFMPC (AFPMSC), and 61MAW, info PACAF (DPSP), *et al.*, "Casualty Message, Initial Death Report, Battle," 040831ZMar68; msg 61MAW (61POAR) to CSAF (AFPMSC) and USAFMPC (AFPMSCA), info CINCPACAF (DPSP), *et al.*, "Casualty Message, Supplementary Death Report, Battle," 050156ZMar68; and msg 377CSG (BDPMP) to CSAF and USAFMPC (AFPMSC), info PACAF (DPSP), *et al.*, "Casualty Report, Supplementary Death Report, Battle," 051031ZMar68.

[151] Msg 61MAW (61PDAR) to CSAF (AFPMSC) and USAFMPC (AFPMSCA), info CINCPACAF (DPSP) *et al.*, "Casualty Message, Supplementary Death Report, Battle," 200308ZMar68; msg 14CSG (BDPMPCR) to CSAF and USAFMPC (AFPMSC), info 7AF (DPSP), *et al.*, "Casualty Report-Supplementary Death Report-Battle," 210944ZMar68; and msg 14CSG (BDPMPCR) to CSAF and USAFMPC (AFPMSC), info 7AF (DPSP), *et al.*, "Casualty Report-Supplementary Death Report-Battle," 210401ZMar68.

[152] "Booby Traps in Vietnam," *PACAF News Service*, No. 67, 9Feb68.

[153] Fuller and Milloy, Vol I, *Narrative* (S), pp. 320-28, 341, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[154] McChristian, *The Role of Military Intelligence: 1965-1967*, p. 156.

[155] Fuller, *Weather and War* (Scott AFB IL: Office of MAC History, Dec74), p. 13.

[156] Fuller and Milloy, Vol I, *Narrative*, (S), pp. 163-64, 443, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[157] See, for example, Tabs 2, 27, 29, 30, 36, 37, 38, 42, 44, 48, 51, 55, 57, 61, 73, 81, 92, 101, 102, 104, and 107 of Fuller, ed., "End of Tour Reports," 15Apr70, on file in the AWS historical archives.

[158] Col Loren L. Lorenzen, 5WS comdr, "End of Tour Report," n.d. (*circa* Aug70), on file in the AWS historical archives.

[159] Ltr and atch Col Daniel B. Mitchell, 1WG comdr, to 1WW, "Project CORONA HARVEST End of Tour Report," n.d. (*circa* 7Jan70), included within Tab 104 of Fuller, ed., "End of Tour Reports," 15Apr70.

[160] Telephone interview by author with Col (USAF ret) Mortimer F. Bennet, Lebanon, IL, on 23Jan79.

[161] Ltr Cummins to 1WG, "End of Tour Report," 3Aug69, included within Tab 81 of Fuller, ed., "End of Tour Reports," 15Apr70.

[162] Fuller, ed., draft, *Keith R. Grimes, Special Operations Weatherman: An Oral Autobiography*, Mar78, pp. 256-57.

[163] Fuller and Milloy, Vol I, *Narrative* (S), pp. 433-36, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[164] *Ibid.*, 484-86; and McChristian, *The Role of Military Intelligence: 1965-1967*, 156.

[165] Fuller and Milloy, Vol I, *Narrative*, p. 482, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[166] Ltr Cummins to 1WG, "End of Tour Report," 3Aug69, included within Tab 81 of Fuller, ed., "End of Tour Reports," 15Apr70.

[167] Fuller and Milloy, Vol I, *Narrative* (S), pp. 393-406, 436-86, of *The Air Weather Service in Southeast Asia*, 15Nov68. Info used (U).

[168] *Ibid.*, 408-11.

[169] *Ibid.*

[170] Vol I, "Narrative," (S), pp. lvi, 311-12, of "History of the Air Weather Service," 1Jul69-30Jun70. Info used (U).

[171] *Ibid.*, 372-401.

[172] *Ibid.*, 332-33.

[173] *Ibid.*, 311-401.

CHAPTER 3 - ARMY (AND AWS) ORGANIZATION, 1970s

[1]Maj William C. Culver, "Air Weather Service Tactical Weather Support to the US Army: A Problem in Concept," Air Command and Staff College thesis, May73, pp. 3-50, included as Sup Doc #40 in Vol III of "History of the 5th Weather Wing," Jan-Jun73.

[2]U.S. Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1975*, 93d Cong, 2d Sess, Pt. 1, 1974, pp. 608-09, 686.

[3]"Organization of the Army," pp. 26-30, Chap 3, *Army General Purpose Forces*, of Vol II, *National and Military Strategy* (Maxwell AFB, AL: Air War College, Air University, USAF, Aug75).

[4]*Ibid.*,; and paper by Mr. Kenneth M. Barnett (Acting Director, Atmospheric Sciences Laboratory, U.S. Army Electronics Comd, Ft Monmouth, NJ), "Atmospheric Influences Upon Military Operations," presented at the fourth technical exchange conference at Fort Monmouth, NJ, on 29Apr68, the complete text of which is included in AWS Technical Report 207, *Proceedings of the Technical Exchange Conference: Fort Monmouth, N.J., 29 April - 1 May 1968* (Jul68), itself included within Tab J, Vol VI, "Supplements," of "History of Air Weather Service," 1Jul69-30Jun70 (S). Info used (U). The latter source is hereinafter cited as Barnett, "The Army Met Function."

[5]Point paper, Mr. John F. Shea, asst DCS Plans, HQ MAC, "Air Staff Weather Manpower," 26Jul78.

[6]For examples of those differences, see Vol I, "Narrative," pp. 225, *et passim*, of "History of Air Weather Service," 1Jul71-30Jun72.

[7]Barnett, "The Army Met Function."

[8]*Ibid.*

[9]*Ibid.*

[10]AWS Manual 23-1, *Organization and Mission - Field: HQ AWS Organization and Functions*, 1Sep73, p. 35, included within Tab 75 in Vol XI, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74, (S). Info used (U).

[11]5WW, *Activities Report on US Army Weather Support, 1Jul-30Sep71* (FOUO), 15Oct71, p. 1, and *Activities Report on US Army Weather Support, 1Oct-31Dec71* (FOUO), 14Jan72, p. 1, included as Sup Docs # 18 and 20, respectively, in "History of the 5th Weather Wing," Jul-Dec71.

[12]AWS Manual 23-1, *Organization and Mission - Field: HQ AWS Organization and Functions*, 1Sep73, p. 31, included within Tab 75 in Vol XI, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74, (S). Info used (U).

[13]U.S. Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1973*, 93d Cong, 1st Sess, Pt 1, 1073, pp. 573-74; and U.S. Congress, House, Subcommittee on Dept of Defense of the Committee

[13](Cont) on Appropriations, *Hearings, Department of Defense Appropriations for 1975*, 93d Cong, 2d Sess, Pt 1, 1974, pp. 608-09, 686.

See also Vol I, "History of the 5th Weather Wing," Jan-Jun73, pp. 17-18, and Sup Docs #36 through 39 in Vol II of that history; "History of 16th Weather Squadron," Jul-Dec73, pp. 6h-6i, included as Appendix E in Vol I of "History of the 5th Weather Wing," Jul-Dec73.

[14]Vol I, *Narrative*, p. 82, of *History of Air Weather Service*, 1Jul74-31Dec75 (S). Info used (U).

[15]Vol I, *Narrative*, pp. 2, 11, 79-81, of *History of Air Weather Service*, 1976 (S). Info used (U).

[16]*Ibid.*, pp. 81-82.

[17]Vol I, p. 21, of "History of the 1st Weather Wing," Jul-Dec74.

[18]Ltr Lt Col Joseph W. Martin, Jr, ops officer, 16WS, to OL-E 16WS, "Concept of Centralized Support for Tactical Army Forces," 14Jan76, included as Sup Doc #3 to "History of 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5, Vol 2, to "History of 5th Weather Wing," Jan-Jun76.

[19]Col Joseph D. Saccone (asst DCS Ops, HQ AWS) and Mr. John A. Lockerd (Tech Dir, CACDA), "Minutes of the 1st Joint Working Group on Weather Support to the Army," n.d. (*circa* May74), included within Sup Doc #8 to "History of 16th Weather Squadron," Jan-Jun74, itself included as Appendix 5, Vol 2, of "History of 5th Weather Wing," Jan-Jun74.

[20]Ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW DO (M) 7203)," 6May77, included within Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun77, itself included within Appendix 2, Vol 1, of "History of 5th Weather Wing," Jan-Jun77.

[21]Ltr Macy to OL-C 5WW, "Unit Information Report - December 1978," 8Jan79, included within Sup Doc #3 to "History of OL-A, C and E, 5th Weather Wing," Jul-Dec78, itself included as Appendix 2 to Vol 1 of "History of 5th Weather Wing," Jul-Dec78.

[22]AWS Historical Study #4, *History of Weather Support to the United States Army*, Dec58, pp. 355-58.

[23]Annex B, para 3, to ltr Gen John C. Meyer, USAF vice ch of staff, to AF/CC (USAF ch of staff), "Trip Report," 19Nov71.

[24]Vol I, "Narrative," pp. 224-25, of "History of Air Weather Service," 1Jul71-30Jun72 (S). Info used (U).

[25]Vol I, "Narrative," pp. 144-47, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[26]*Ibid.*, pp. 226, 247.

[27]Col John T. McCabe, 1WG vice comdr, "SEA End of Tour Report," n.d. (*circa* Jul70), on file in the AWS historical archives.

[28]Best's reply penned in green ink to *ibid.*

[29]Ltr Capt Dale D. Webster, Rqmts Validation Directorate (AWS/DOQ), DCS Ops, HQ AWS, to AWS (CS--ch of staff), *et al.*, "Trip Report, 2WWg Units in Germany, 16-24 March 1972," 10Apr72, included as Tab 25 in Vol VII, "Supplements," of "History of Air Weather Service," 1Jul71-30Jun72 (S). Info used (U).

[30]Fuller, "Text of Interview With Brigadier General William H. Best, Jr, (Commander of Air Weather Service)," 19-20Jun73, pp. 34-38, included as Sup Doc #1 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[31]Vol I, "Narrative," pp. 158, 160, 168, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[32]Aldrich's remarks herein recorded by author at the HQ AWS staff meeting of 26Oct73.

[33]Memo and atch Lt Col Malcolm Reid, staff weather officer to USACDC, to Col William H. Shivar, 16WS comdr, "Army Meteorological Activities," 20Mar71.

[34]Barnett, "The Army Met Function." See also "Defense Policy: DoD Meteorological Services," *Commanders Digest*, Vol 14, No. 18 (1Nov73), pp. 8-9.

[35]Ltr and atch Col J. C. Wilson, ch, tac/strategic div (DAMI-DOT-T), office of asst ch of staff for Intel, Dept of Army, to TRADOC (comdr), "Federal Plan for Meteorological Services and Supporting Research, FY 77," 30Sep75, included as Sup Doc #36 to "History of 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7, Vol 2, to "History of the 5th Weather Wing," Jul-Dec75.

[36]See, for example, U.S., Congress, House, Subcommittee on Dept of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1974*, 93d Cong, 1st Sess, Pt 7, 1973, p. 327.

[37]Ltr and 2 atch Col Cooke W. Leutwyler, Dir of Rqmts (AWS/DOQ) DCS Ops, HQ AWS, to 1WW (DO), *et al.*, "Tactical Weather Support Concepts Conference, 15-17 Sep 75," 24Oct75, included as Sup Doc #68 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[38]Rowe's comments recorded by the author at the HQ AWS staff meeting of 2Oct75.

[39]*Ibid.*

[40]Ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (CC), "Unit Information Report: RCS 5WW/DO(M)7203," 31Mar76, included within Sup Doc #11 to "History of 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5, Vol 2, to "History of the 5th Weather Wing," Jan-Jun76.

[41]Ltr Col Martin, ops off, 16WS, to 5WW (CC), "Unit Information Report: RCS 5WW/DO(M)7203," 30Apr76, and ltr Martin to 5WW (CC), "Unit Information Report, RCS: 5 WW/DO(M)7203," 31May76, both included within Sup Doc #11 to "History of 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5, Vol 2, to "History of the 5th Weather Wing," Jan-Jun76.

[42]The remarks by Rowe, Gayikian, and LeMole were recorded by the author at the HQ AWS staff meeting of 7Oct76.

[43]Ltr Lt Col Darrell T. Holland, staff weather officer to the Combined Arms Center, Ft Leavenworth, to OL-C, 5WW, "CAC Staff Weather Officer Activities Report, September 1976," 18Oct76, included within Sup Doc #15 to "History of 16th Weather Squadron," Jul-Dec76, itself included as Appendix 5, Vol 2, to "History of the 5th Weather Wing," Jul-Dec76.

[44]Ltr Holland to OL-C, 5WW, "Unit Information Report - August 1977," 2Sep77, included within Sup Doc #11 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2, Vol 1, of "History of the 5th Weather Wing," Jul-Dec77.

[45]Point paper, Col Donald E. Smith, Dir of Rqmts (AWS/DOQ) DCS Ops, HQ AWS, "U.S. Army Organization, Manpower, Budget for Meteorological Services (AWS/CC Testimony on H.R. 8763)," 19May78.

[46]Telephone interview by author with Cummins, 19Jun78.

[47]See "Army Weather Support: Text of Interview by Mr. John F. Fuller, AWS Historian, with Brigadier General Berry W. Rowe, AWS Commander, 26 and 28 June 1978," pp. 64-65, included as Sup Doc #4, in Vol II, "Supporting Documents," of this history. This document is hereinafter cited as *Rowe Interview: Army Weather Support.*

[48]Ltr Lt Col Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW DO(M) 7203)," 2Aug78; and ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW DO(M) 7203)," 5Jan79--included together within Sup Doc #1 to "History of OL-A, C and E, 5th Weather Wing," Jul-Dec78, itself included as Appendix 2 in Vol 1 of "History of 5th Weather Wing," Jul-Dec78.

CHAPTER 4 - MANPOWER AND MANNING

[1]AWS Manual 55-2, *Operations: Weather Support for Joint Force Operations*, 30Mar73, p. 3-1, and AWS Reg 55-2, "Operations: AWS Tactical Weather Support," 31Aug77, p. 4-1. The latter directive superseded the first, and both are included as supporting documents to this study, as referenced elsewhere herein.

[2]16WS Sup 1 to 5WW Manual 50-2, *Training: Contingency/Exercise Readiness Training*, 3Dec70, included as Sup Doc #8 to "History of 16th Weather Squadron," Oct-Dec70, itself included as Atch F to "History of the 5th Weather Wing," Oct-Dec70.

[3]5WW, *Activities Report on US Army Weather Support, 1 Jan-31 Mar 1971* (FOUO), 15Apr71, p. 1, included as Sup Doc #4 to "History of the 5th Weather Wing," Jan-Mar71.

[4]"History of 16th Weather Squadron," Jul-Dec71, pp. 6D-6E, included as Atch F to "History of the 5th Weather Wing," Jul-Dec71.

[5]See: ltr and atch ("Army Weather Support") Col James M. Burkhart, 2WW comdr, to AWS (CC), "US Army Weather Support in Europe," 17May71; ltr Col Edwin E. Carmell, DCS Ops, HQ AWS, to 2WW (CC), "US Army Weather Support in Europe (Your Ltr, 17 May 71)," 16Jun71; ltr Col James M. Dunn, ch, ops div, 2WW, to AWS (DOQ), "WETM/CWT Support for USAREUR," 3Oct72; ltr and 5 atch Col Oliver W. Dillard, Dir of Intel Spt (DAMI-DST-E), Dept of the Army, to HQ USAF (AF/PRW), "U.S. Army Requirement for Direct Weather Service Support," 31Aug71; ltr Maj Gen S. F. Martin, asst DCS Programs and Resources, HQ USAF, to Dir of Intel Spt, ACSI (DAMI-DS), Dept of the Army, "US Army Requirement for Direct Weather Service (Tactical Divisions Assigned to USAREUR) (Your Ltr, 31 Aug 1971)," 24Nov71; ltr Maj Gen Martin to Dir of Intel Spt, ACSI (SAMI-DS), Dept of the Army, "US Army Requirements for Direct Weather Service," 24Nov71; and ltr Col Louis A. Gazzaniga, Asst for Weather (AF/PRW), DCS Programs and Resources, HQ USAF, to MAC (XPMRT), "US Army Requirements for Direct Weather Service," 30Nov71.

[6]Ltr Capt Dale D. Webster, Rqmts Validation Directorate (AWS/-DOQ), DCS Ops, HQ AWS, to AWS (CS--ch of staff), *et al.*, "Trip Report, 2WWg Units in Germany, 16-24 March 1972," 10Apr72, included as Tab 25 in Vol VII, "Supplements," to the "History of Air Weather Service," Jul71-Jun72 (S). Info used (U).

[7]Ltr Col Leonard E. Zapinski, DCS Ops, HQ AWS, to AWS Staff, *et al.*, "Report of AWS Commander's Trip to European Area," 25Sep72, included as Tab 29 in Vol X, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[8]Ltr Col James R. Blankenship, Dep Asst for Wx (AF/PRW), DCS for Programs and Resources, HQ USAF, to Dept of Army (DAMI-DSI-C), "Direct Weather Service Support," 12Jun73, included as Sup Doc #41 in Vol III of "History of the 5th Weather Wing," Jan-Jun73.

See also: ltr and atch AWS to Det 15, 1200 Spt Sq, "Direct Weather Service Support to Deployed Army Divisions in Europe," 6Mar73; ltr Col Leon R. Tucker, ch, ops div, 2WW, to AWS (DOQ), "SOR, USTASCOMEUR," 12Mar73; ltr and atch Col Fred R. Mathews, Dep Dir of Manpower and Org, DCS Plans, HQ MAC, to HQ USAF (PRW), "Direct Weather Service Support to the Army," 3Apr73; and ltr Blankenship to MAC (XPMRT), "Direct Weather Service Support to the Army," 25May73--included together as Sup Doc #5 in Vol II, "Supporting Documents," of this study.

Additionally, see HQ AWS, "Staff Meeting Minutes," No. 25, 18-22Jun73, pp. 3-4.

[9]Ltr Aldrich to AWS Staff and 5WW (CC), "Report of AWS/CC Trip to 5WW and 16WS, 26-28 September 1973," 1Oct73, included as Tab 57 in Vol X, "Supplements," to "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[10] Ltr Aldrich to AWS staff, *et al.*, "Report of AWS/CC Trip to 2WW," 19Oct73, included as Tab 60 in Vol X, "Supplements," to "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[11] Aldrich's remarks recorded by the author at the HQ AWS staff meeting of 15Oct73.

[12] Atch 1 to ltr Lt Col William C. Montgomery, OL-D, 16WS, to 5WW, *et al.*, "SWO Conference," 17Jan74, included as Sup Doc #4 to "History of 16th Weather Squadron," Jul-Dec73, itself included as Atch E to "History of the 5th Weather Wing," Jul-Dec73. See also "History of the 16th Weather Squadron," Jul-Dec74, pp. 12-14, included as Appendix 5, Vol 2, of "History of the 5th Weather Wing," Jul-Dec74.

[13] Ltr Maj Dell V. McDonald, staff weather officer to CACDA, to 16WS (CC), "CAC Staff Weather Officer Activities Report, April 1976," 10May76, included within Sup Doc #10 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[14] Much of the spadework was attributable to Capt Frederick F. Haddad, at wing headquarters, who worked very closely with Lt Col Owens at USAICS and Maj McDonald at CACDA on the TOE and UTC revisions.

[15] "History of the 5th Weather Wing," Jan-Jun76, p. 20.

[16] The proposed UTCs are included as Sup Doc #77 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76.

[17] Ltr CACDA to AWS (comdr), "Army TOE Elements for AWS Weather Teams (WETMs)," 2Jul76, included within Sup Doc #78 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76.

[18] Ltr Brig Gen Aldrich, AWS comdr, to AWS staff and 5WW (CC), "Report of AWS/CC Trip to 5WW and 16WS, 26-28 September 1973," 1Oct73, included as Tab 57 in Vol X, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74.

[19] Dept of Army Form 2496, *Action Trip Report*, Maj Dell V. McDonald, OL-E 16 WS (staff wx officer Combined Arms Combat Developments Agency, Ft Leavenworth) to Dep Comdr, CACDA, "Army/Air Force Weather Conference (20Feb74)," 25Feb74, included as Sup Doc #7 to "History of 16th Weather Squadron," Jan-Jun74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun74.

[20] "Minutes of the 2d Joint Working Group Weather Support to the Army, Langley AFB, VA, 22-23Oct74," included within Appendix 6 to "History of 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[21] "Post Exercise Critique: REFORGER 77," n.d., included as atch to "History of the 7th Weather Squadron," Jul-Dec77, itself included as Appendix 2 to "History of the 2d Weather Wing," Jul-Dec77.

[22] Point paper, Col Norman F. Rauscher, asst DCS Ops, HQ AWS, "AWS Manpower/Manning (AWS/CC Testimony on H.R. 8763)," 22May78.

[23]Tech Plans Div (AWS/DOQX), Directorate of Rqmts, DCS Ops, HQ AWS, "Semiannual Report of Activities," Jul-Dec78, p. 2, included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[24]Ltr Swayne to Mr. Beck, Dept of the Army (DAMI-TST-I), "Army Weather Support," 22Dec77, included as Sup Doc #6 in Vol II, "Supporting Documents," of this study.

[25]See: ltr Maj Jerry E. Albrecht, current ops officer, 7WS, to 2WW (DOOQ), "Additional Manning for OL-A and OL-B," 27Jul78; and ltr Col John J. Elliff, 7WS comdr, to 2WW (DO), "OWT Configuration (AWS/DOQP Ltr, 18 August 1978)," 21Sep78--included, respectively, as Sup Docs # 59 and 60 to "History of the 7th Weather Squadron," Jul-Dec78, itself included as Appendix 3 to "History of the 2d Weather Wing," Jul-Dec78.

[26]Ltr Lt Col Swayne, AWS/LN, to TRADOC (ATFE), "Liaison Activities (RCS ATFE-2)," 1Mar79.

[27]All supporting documentation for this additional manning is included within Sup Doc #2 to "History of the 1st Weather Wing," Jul-Dec77.

[28]See: ltr Col Joe K. Ando, Dep Dir of Manpower and Org (MAC/-XPMRZ), DCS Plans, HQ MAC, to Eighth Army comdr, "Statement of Requirements for Direct Weather Support, Eighth US Army, Korea (AR 115-12)," 24Aug78; and ltr Col Charles F. Donohue, MAC/XPMRZ, to Eighth Army comdr, "Statement of Requirements forDirect Weather Support, Eighth US Army, Korea (Your Ltr, 11Oct78)," 27Oct78--included, respectively, as Atchs 1 and 2 to ltr Capt William A. Anderson, 30WS historian, to 1WW (DOO), "Historical Report (1Jul-31Dec78)," 12Jan79, itself included as Sup Doc #12 to "History of the 1st Weather Wing," Jul-Dec78.

[29]Ltr Lt Col John H. Taylor, MAC IG team ch, to Det 18 (CC) 30WS, "Report of Inspection," 18Nov78, pp. 2, 9-10.

[30]Ltr and atch ("EUSA [Eighth U.S. Army] Support Study") Lt Col Joseph W. Martin, Jr, ch, ops br, 30WS, to 1WW (DO), "Reorganization of Support to EUSA," 7Dec78, included as Atch 5 to ltr Capt Anderson, 30WS historian, to 1WW (DOO), "Historical Report (1Jul-31Dec78)," 12Jan79, itself included as Sup Doc #12 to "History of the 1st Weather Wing," Jul-Dec78.

[31]Vol I, "Narrative," pp. 456-58, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[32]See Vol I, *Narrative*, pp. 241-42, 248, of *History of Air Weather Service*, 1976 (S). Info used (U).

[33]AWS Reg 55-2, "Operations: AWS Tactical Weather Support," 31Aug77, p. 6-1.

[34]Ltr Col Hyko Gayikian, DCS Ops, HQ AWS, to 1WW (DO),*et al.*, "Assignment of WAF to Organic Weather Teams (OWTs)," 18Feb75, and msg Dept of Army (DAMO-FDU) to ALARACT, "Women in Category I Units," 041453ZFeb75, included, respectively, as Sup Docs #35 and 36 to "His-

[34](Cont) tory of 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 to "History of the 5th Weather Wing," Jan-Jun75.

[35]Vol I, "Narrative," pp. 60-61, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[36]Carmell's remarks recorded by the author at the HQ AWS staff meeting of 27Dec72.

[37]From remarks by Rowe recorded by the author at the HQ AWS staff meeting of 11Mar76.

[38]Vol I, *Narrative*, pp. 65-66, of *History of Air Weather Service*, 1976 (S). Info used (U).

CHAPTER 5 - EQUIPMENT AND MAINTENANCE

[1]5WW, *Activities Report on US Army Weather Support*, 15Apr71, p. 1, included as Sup Doc #4 to "History of the 5th Weather Wing," Jan-Mar71.

[2]Including the AN/TMQ-14, AN/TMQ-15, and AN/TMQ-20 components, air conditioning, and ancillary equipment. (Telephone conversation by author on 28Sep78 with Mr. Max M. James, Ground Systems Engineering (AWS/LGLG), Directorate of Met Systems Engineering, DCS Logistics, HQ AWS.)

[3]Vol IV, *Support: Weather Services* (S), 2Nov70, pp. 10, 17-18, 23 of PACAF's Project Corona Harvest input for period 1Apr68-31Dec69, with the overall title of *In-Country and Out-Country Strike Operations in Southeast Asia*. Info used (U).

[4]Fuller and Maj William T. French, Jr, "Text of Interview with Colonel Ralph G. Suggs (Vice Commander, Air Weather Service, Aug 1967 - Feb 1970)," 1Jul70, pp. 9-11, included as Sup Doc #37 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul69-30Jun70 (S). Info used (U).

[5]Telephone conversation by author on 29Sep78 with Mr. Max M. James, Ground Systems Engineering (AWS/LGLG), Directorate of Met Systems Engineering, DCS Logistics, HQ AWS.

[6]See Vol I, "Narrative," pp. 28-29, of "History of Air Weather Service," 1Jul67-30Jun69 (S). Info used (U).

[7]Fuller, "The AN/TNQ-25 Tactical Ceilometer: (SEAOR 95)," Dec76, on file in AWS historical archives.

[8]*Ibid.*

[9]Msg 1WW (LGC) to AWS (LG) and 1WG (LG), "TMQ-25 Problems," 150230ZMar72.

[10]Fuller, "The AN/TMQ-25 Tactical Ceilometer: (SEAOR 95)," Dec76.

[11] *Ibid.*

[12] Ltr Col Joseph W. Martin, Jr, ops officer, 16WS, to 5WW (DOXX and DOXY), "TWECB/TMQ-25," 17May76, included as Sup Doc #7 to "History of 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[13] "History of 16th Weather Squadron," Jul-Dec73, p. 6f, included as Atch E to "History of the 5th Weather Wing," Jul-Dec73.

[14] Ltr Col David L. Roberts, ch, ops div, 5WW, to USCINCRED (RCJ3-TX), *et al.*, "Minutes of 5WW Tactical Weather Equipment Control Board (TWECB) Meeting, 12 Dec 75," 29Dec75, included as Sup Doc #61 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[15] Ltr Col Frank D. Reeder, ch, ops div, 2WW, to AWS (DO), "AN/-TMQ-25 Tactical Cloud Height Set Requirements," 26Jan76, included as Atch 4 to ltr and 5 atch Capt Nelson Arzola, 5WW (DOXX), to 7WW, *et al.*, "Minutes of the Tactical Weather Equipment Control Board (TWECB) 2 April 1976," 3May76, included as Sup Doc #80 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76.

[16] Directorate of Environmental Services (AWS/DOS), DCS Ops, HQ AWS, "Semiannual Historical Report," Jan-Jun77, p. 4, included within the "Supplements" volumes of *History of Air Weather Service*, 1977.

[17] Ltr and atch ("US Forestry Service Contributes to Southeast Asian War Effort") Col Arthur W. Anderson, ch of staff, AWS, to MAC (MAXPD), "Weekly Report for the President," 4Nov66.

[18] Ltr and atch Lt Col John W. Reames, ch, ops and trng br, wx ops div, HQ TAC (WEO), to HQ USAF (PRW), *et al.*, "Concept of Operations for the Tactical Meteorological Measuring Set (AN/TMQ-22)," 2Aug74, included as Sup Doc #56 in Vol IV of "History of the 5th Weather Wing," Jul-Dec74.

[19] Announcement by Col Douglas C. Purdy, DCS Ops, HQ AWS, recorded by the author at the morning weather reconnaissance briefing at HQ AWS on 27Mar70, and from remarks by Col Edwin E. Carmell, asst DCS Ops, HQ AWS on 2Sep70. See also: ltr and atch Lt Col Mortimer F. Bennet, HQ AWS Tactical Weather Support Panel, "Report of HQ AWS Tactical Weather Support Capabilities Panel 70-6," 22Jul70, p. 4; and HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Jul70, pp. 1-2, included as Sup Doc #1 to "History of the 5th Weather Wing," Apr-Jun70.

[20] HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Oct70, p. 1, included as Sup Doc #1 to "History of the 5th Weather Wing," Jul-Sep70.

[21] The remarks of Best and Carmell were recorded by the author at the morning weather reconnaissance briefing at HQ AWS on 2Sep70.

[22] Ltr Col Arthur W. Anderson, ch of staff, AWS, to AWS (SY, *et al.*), "Staff Meeting Actions - 24 September 1970," 24Sep70.

[23] Best's remarks recorded by the author at the morning weather reconnaissance briefing at HQ AWS on 16Sep70.

[24]Best's remarks recorded by the author at the morning weather reconnaissance briefing at HQ AWS on 24Sep70.

[25]5WW, *Activities Report on US Army Weather Support* (FOUO) 15Apr71, p. 4, included as Sup Doc #4 in "History of the 5th Weather Wing," Jan-Mar71, and HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Jul72, p. 4, included as Sup Doc #61 in Vol III of "History of the 5th Weather Wing," Jan-Jun72.

[26]Msg ESD to OCAMA, info AWS (DME and DMS) and Comd Gen USAECOM, "MIPR [Military Interdepartmental Purchase Request] 2835-70-00028 for AN/TMQ-22 Equipment," 211825ZApr71.

[27]See: TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 1Apr73, p. 2, included as Sup Doc #47 in Vol III of "History of the 5th Weather Wing," Jan-Jun73; HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Jul73, p. 2, included as Sup Doc #48 in Vol III of "History of the 5th Weather Wing," Jan-Jun73; HQ TAC, *Activities Report on Tactical Weather Systems/-Equipment* (FOUO), 15Oct73, p. 3, included as Sup Doc #55 in Vol II of "History of the 5th Weather Wing," Jul-Dec73; HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Apr74, p. 3, included as Sup Doc #44 in Vol IV of "History of the 5th Weather Wing," Jan-Jun74; HQ TAC, *Activities Report on Tactical Weather Systems/-Equipment* (FOUO), 15Jan75, p. 3, included as Sup Doc #61 in Vol IV of "History of the 5th Weather Wing," Jul-Dec74; HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Jul75, p. 2, included as Sup Doc #59 in Vol IV of "History of the 5th Weather Wing," Jan-Jun75; HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Oct75, p. 3, and HQ TAC, *Activities Report on Tactical Weather Systems/Equipment* (FOUO), 15Jan76, p. 2, included as Sup Docs #71 and 72, respectively, in "History of the 5th Weather Wing," Jul-Dec75.

[28]From announcement by Col Hyko Gayikian, DCS Ops, HQ AWS, recorded by the author at the HQ AWS staff meeting of 16Jan75.

[29]Ltr and 5 atch Capt Nelson Arzola, 5WW (DOXX), to 7WW, *et al.*, "Minutes of the Tactical Weather Equipment Control Board (TWECB), 2 April 1976," 3May76, included as Sup Doc #80 in Vol III of "History of the 5th Weather Wing," Jan-Jun76.

[30]Vol I, *Narrative*, pp. 58-59, of *History of Air Weather Service*, 1976 (S). Info used (U).

[31]DCS Logistics, HQ AWS, "Historical Report," Jan-Jun77, pp.5-6, included within the "Supplements" volumes to *History of Air Weather Service*, 1977.

[32]Ltr Col John R. Moulton, MAC IG, to 2WW (CC), "Report of Management Effectiveness Inspection, 16-20 May 1977," 20May77, pp. 10-11, included within the "Supplements" volumes to *History of Air Weather Service*, 1977.

[33]Readiness Div (AWS/DOQP), Directorate of Rqmts, DCS Ops, HQ AWS, "Semiannual Report of Activities," Jul-Dec77, p. 3, included within the "Supplements," volumes to *History of Air Weather Service*, 1977.

[34]AWSR 55-2, "Operations: AWS Tactical Weather Support," 31Aug77.

[35]HQ AWS, "Staff Meeting Minutes," No. 31, 5-12Oct78, p. 1; DCS Logistics, HQ AWS, "Historical Report," Jul-Dec78, p. 6, included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[36]HQ AWS, "Staff Meeting Minutes," No. 22, 22Jun78, p. 1.

[37]Lt Col William J. Haugen, DCS Logistics, HQ AWS, "Significant Events - LG," 22Sep78.

[38]HQ AWS, "Staff Meeting Minutes," No. 1, 4-11Jan79, p. 1.

[39]AWS Recurring Pub 105-1, *Operations Digest*, No. 5 (May79), p. 11.

[40]HQ TAC, *Activities Report on Tactical Weather Systems/Equipment*, 15Apr70, p. 2, included as Sup Doc #2 in "History of the 5th Weather Wing," Oct-Dec70; HQ TAC, *Activities Report on Tactical Weather Systems/-Equipment*, 15Jul71, p. 5, included as Sup Doc #6 in "History of the 5th Weather Wing," Apr-Jun71; and HQ TAC, *Activities Report on Tactical Weather Systems/Equipment*, 15Oct71, pp. 2-3, included as Sup Doc # 17 in "History of the 5th Weather Wing," Jul-Dec71.

[41]TAC Concept Review, *A Tactical Weather Subsystem to Interface with USAF Global Weather System During 1970-1975* (Langley AFB, VA: HQ TAC, 15Oct69), p. 1.

[42]Ltr and 5 atch Lt Col William E. Cummins, II, Rqmts Validation and Fcsting Spt Div, DCS Ops, HQ AWS, to 1WW, *et al.*, "Army Weather Support Conference," 18May70.

[43]HQ TAC, *Activities Report on Tactical Weather Systems/Equipment*, 15Jan72, p. 3, included as Sup Doc #19 in "History of the 5th Weather Wing," Jul-Dec71.

[44]Directorate of Fcstg Svcs, DCS Ops, HQ AWS, "Semi-Annual Report of Activities," Jul-Dec71, pp. 4-5, included within Tab 6 in Vol VI, "Supplements," of "History of Air Weather Service," 1Jul71-30Jun72 (S). Info used (U).

[45]Ltr and 5 atch Lt Col Raymond B. MacQueen, Directorate of Rqmts Validation, DCS Ops, HQ AWS, to USACDC, *et al.*, "USACDC Visit to Hq AWS," 1Feb72.

[46]HQ TAC, *Activities Report on Tactical Weather Systems/Equipment*, 15Jul72, p. 3, included as Sup Doc #61 in Vol III of "History of the 5th Weather Wing," Jan-Jun72.

[47]HQ TAC, *Activities Report on Tactical Weather Sensors/Equipment*, 15Oct72, p. 2, included as Sup Doc #36 in Vol II of "History of the 5th Weather Wing," Jul-Dec72.

[48]HQ TAC, *Activities Report on Tactical Weather Systems/Equipment*, 1Apr73, p. 5, included as Sup Doc #48 in Vol III of "History of the 5th Weather Wing," Jan-Jun73.

[49]Text of briefing by Lt Col Peter N. Micale, HQ AWS (AWS/DOO), "Ground Equipment Acquisition," presented at the AWS commanders conference of 30-31Jul73, included as pp. 14-2 through 14-26 in Sup

[49](Cont)Doc #125, Vol IV, "Supporting Documents," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[50]HQ TAC, *Activities Report on Tactical Weather Systems/Equipment*, 15Jan74, pp. 1-2, included as Sup Doc #56 in Vol III of "History of the 5th Weather Wing." Jul-Dec73.

[51]HQ TAC, *Activities Report on Tactical Weather Sensors/Equipment*, 15Oct73, p. 3, included as Sup Doc #55 in *ibid.*

[52]6WW Recurring Pub 105-1, *Technical Activities Summary*, No. 2 (Feb74), p. 9.

[53]HQ TAC, *Activities Report on Tactical Weather Sensors/Equipment*, 15Apr74, p. 3, included as Sup Doc #44 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun74.

[54]6WW, *Technical Activities Summary* (Jul74), pp. 5-6, HQ TAC, *Activities Report on Tactical Weather Sensors/Equipment*, 15Jul74, p. 3, included as Sup Doc #45 in Vol 4 of *ibid.*

[55]Directorate of Obs Svcs and Equip, DCS Ops, HQ AWS, "Semiannual Historical Report," Jan-Jun74, included within Tab 4 in Vol IX, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74.

[56]HQ TAC, *Activities Report on Tactical Weather Sensors/Equipment*, 15Oct74, p. 2, included as Sup Doc #60 in Vol 4 of "History of the 5th Weather Wing," Jul-Dec74; 6WW, *Technical Activities Summary*, Jul74, p. 5, Aug74, p. 25, Oct74, p. 8, and Nov74, p. 7.

[57]Ltr and atch Lt Col John W. Reames, ch, wea ops and trng br, wea ops div, HQ 5WW, to HQ USAF (PRW), *et al.*, "Concept of Operations for Tactical Weather Radar (TWR)," 2Aug74, included as Sup Doc #57 in Vol 4 of "History of the 5th Weather Wing," Jul-Dec74.

[58]2WS, *Technical Activities Summary*, Aug75, p. 12.

[59]*Ibid.*, May76, p. 20.

[60]*Ibid.*, Sep77, p. 10; Directorate of Environmental Sensors (AWS/DOS), DCS Ops, HQ AWS, "Semiannual Historical Report," Jul-Dec77, p. 2; and DCS Logistics, HQ AWS, "Historical Report," Jul-Dec77, p. 11--the latter two documents included within the "Supplements" volumes to *History of Air Weather Service*, 1977.

[61]2WS, *Technical Activities Summary*, Apr78, p. 12, and May78, p. 15; DCS Logistics, HQ AWS, "Historical Report," Jan-Jun78, p. 6; Directorate of Environmental Sensors (AWS/DOS), DCS Ops, HQ AWS, "Semiannual Historical Report," Jan-Jun78, p. 2; and AWS/DOS, "Semiannual Historical Report," Jul-Dec78, pp. 2-3--the latter three reports included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[62]*Ibid.*

[63]According to AWSP 105-53, *Weather: Air Weather Service Meteorological Sensors and Related Equipment*, of 30Sep78 (pp. 1-47 through 1-54), the unit cost for the AN/FPS-103 was $26,787, while the cost for six AN/TPS-68s was $4.15 million. The unit cost of the

[63](Cont) two other radars in the AWS inventory in 1978, the AN/CPS-9 (an X-band radar, the first of which was installed in 1954) and the AN/FPS-77 (a C-band radar, the first of which was installed for Category II and III testing in 1964) was $124,945 and $54,112, respectively.

[64]Position paper, Col Salvatore R. LeMole, DCS Ops, HQ AWS, "AWS Position on Acquiring Tactical Weather Radars for Support to Army in the Field Environment," 26Jun78, included as one of eight atch to ltr LeMole to 1WW (DO), *et al.*,"AWS Army Support Position Papers," 26Jun78--itself included as Sup Doc #65 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun78.

[65]Fuller, ed., AWS Historical Study No. 5, *Air Weather Service and Meteorological Satellites: 1950 - 1960*, Dec73, pp. 25-29.

[66]Vol I, *Narrative*, p. 189, of *History of Air Weather Service*, 1976 (S). Info used (U).

[67]Fuller, *Weather and War*, Dec74, p. 16; Momyer, *Air Power in Three Wars*, pp. 228-31; and ltr Gen Momyer, comdr TAC, to HQ USAF (AFRDC), "Transportable Weather Satellite Facility," 10Jan70.

[68]Vol I, *Narrative*, p. 189, of *History of Air Weather Service*, 1976 (S). Info used (U).

[69]*Ibid.*, 219.

[70]Telephone interview by author on 6Oct78 with Col William E. Cummins, II, commander, OL-C, 5WW, at Fort Monroe, VA. Cummins commanded the 5th Weather Squadron from mid-1968 to mid-1969.

[71]Conversation by author on 28Sep78 with Lt Col John H. Haneklau, Env Svcs Div (MAX/XPPE), Directorate of Programming and Policy, DCS Plans, HQ MAC. In 1965-66 Haneklau commanded Det 31, 5WS, at Nha Trang in support of I Field Force.

[72]Telephone interview by author on 2Aug79 with Lt Gen (U.S. Army ret) Tolson.

[73]Reasons why DMSP was operated in such secrecy, which remained classified in 1977, can be found in Vol I, *Narrative*, p. 189, of *History of Air Weather Service*, 1976 (S). Info used (U).

[74]It took a personal message from a three-star general on the Air Staff to the Seventh Air Force commander before Col Leonard E. Zapinski would release DMSP data to the Son Tay raiders. Afterward, the AWS commander at the time came to refer to the raid as the classic case of applying DMSP data to a tactical combat operation. (From remarks by Brig Gen William H. Best, Jr, AWS commander, recorded by the author at the HQ AWS staff meeting of 26May72.) See Vol I, "Narrative," pp. 456-95, of "History of Air Weather Service," 1Jul70-30Jun71 (S) Info used (U); Fuller, draft, *Keith R. Grimes, Special Operations Weatherman: An Oral Autobiography*, Mar78, pp. 163-64; and Benjamin F. Schemmer, *The Raid* (New York: Harper & Row, 1976), pp. 183-86.

[75]Vol I, *Narrative*, p. 191, of *History of Air Weather Service*, 1976 (S). Info used (U).

[76]Ltr Aldrich to AWS Staff, *et al.*, "Report of AWS/CC Trip to 2WW," 19Oct73, included as Tab 60 in Vol X, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74.

[77]Ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Unit Activity Letter February 1976)," 4Mar76, included within Sup Doc #9 to "History of 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[78]Vol I, *Narrative*, pp. 197, 201, of *History of Air Weather Service*, 1976 (S). Info used (U).

[79]*Ibid.*, pp. 190-91.

[80]See: ltr Lt Col Owen Y. Macy, OL-A, 5WW, to OL-C 5WW, "Unit Information Report (RCS: 5WW DO(M) 7203)," 4Oct77; ltr Lt Col Darrell T. Holland, OL-E, 5WW, to OL-C 5WW, "Unit Information Report - August 1977," 2Sep77; ltr Holland to OL-C 5WW, "Unit Information Report - September 1977," 3Oct77; and ltr Holland to OL-C 5WW, "Unit Information Report - December 1977," 5Jan78--all included, respectively, within Sup Docs 9 and 11 of "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[81]*Ibid.*

[82]Col Salvatore R. LeMole (DCS Ops, HQ AWS), Chairman, Program Review Committee, HQ AWS, "Report of HQ AWS Council Meeting [to approve SIDS ROC]," 1Sep76, and 3 atch, included within Sup Doc #39 in Vol II, "Supporting Documents," of *History of Air Weather Service*, 1976 (S). Info used (U).

[83]The SIDS GOR is included as Atch 3 to the Jan-Jun78 historical report of the Aerospace Rqmts Div (AWS/DNTR), Directorate of Aerospace Svcs, DCS Aerospace Sciences, HQ AWS--itself included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[84]"History of the 1st Weather Wing," Jul-Dec78, p. 19.

[85]Directorate of Env Sensors (AWS/DOS), DCS Ops, HQ AWS,"Semi-annual Historical Report," Jul-Dec77, p. 5, included within the "Supplements" volumes to *History of Air Weather Service*, 1977.

[86]The Army's only DMSP readout van was located on Kwajalein, in support of the Kwajalein Missile Range, and the Army contracted for the operation and maintenance.

[87]Position paper, Col Salvatore R. LeMole, DCS Ops, HQ AWS, "AWS Position Concerning the Need for and Capability to Receive High Resolution Satellite Imagery to Support Army Tactical Operations," 26Jun78, included as Atch 7 to ltr LeMole to 1WW (DO), *et al.*, "AWS Army Support Position Papers," 26Jun78--itself included as Sup Doc #65 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun78.

[88]Ltr Lt Col Charles J. Swayne, Army liaison officer to AWS, to TRADOC (ATFE), "Liaison Activities (RCS ATFE-2)," 15Feb79.

[89]"History of the 5th Weather Wing," Jul-Dec78, p. 17.

[90]Vol I, "Narrative," pp. 273-91, of "History of Air Weather Service," 1Jul69-30Jun70 (S). Info used (U).

[91]*Ibid.*, 291-96.

[92]*Ibid.*, 296-308.

[93]U.S., Congress, Senate, Subcommittee of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for Fiscal Year 1970*, 91st Cong, 1st Sess, Pt. 4, 1969, p. 918; and U.S. Congress, House, Subcommittee on Department of Defense of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1972*, 92d Cong, 1st Sess, Pt. 6, 1971, p. 182.

[94]Vol I, "Narrative," pp. 308-11, of "History of Air Weather Service," 1Jul69-30Jun70.

[95]"New Weather Station Will Aid Forecasters," *Observer*, Vol 18, No. 11 (Nov71), p. 6.

[96]Msg CSAF (RDQPS) to TAC (DR and DOQS) and MAC (DR and DOQS), info AWS, AFSC, and AFCRL, "Reaffirmation of Requirement For the Expendable Remote Operating Weather Station (EROWS)," 101953ZFeb72.

[97]HQ TAC, *Activities Report on Tactical Weather System/Equipment*, 15Jul72, p. 4, included as Sup Doc #61 in Vol III of "History of the 5th Weather Wing," Jan-Jun72.

[98]Fuller, "Text of Interview With Brigadier General William H. Best, Jr, (Commander of Air Weather Service)," 19-20Jun73, p. 26, included as Sup Doc #1 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul72-30Jun74.

[99]Msg CSAF (RDP) to AFSC (DL and AC), info AFCRL (LY), *et al.*, "Expendable Remote Operating Weather Station (EROWS)," 242252ZMar72.

[100]HQ TAC, *Activities Report on Tactical Weather System/Equipment*, 15Apr75, p. 3, included as Sup Doc #58 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun75.

[101]Background paper Col Robert M. Gottuso, DCS Aerospace Sciences, HQ AWS, "Tactical Area Weather Sensors (TAWS)," 20Jan77.

[102]Point paper, Col Gottuso, "Remote Automatic Weather Station (RAWS)," 19Sep77.

[103]See the Jul-Dec77 historical report (p. 2) of the Aerospace Rqmts Div (AWS/DNTR), Directorate of Aerospace Svcs, DCS Aerospace Sciences, HQ AWS, included within the "Supplements" volumes to *History of Air Weather Service*, 1977.

[104]The draft PRESSURS GOR of 1May78 is included as Atch 5 to the Jan-Jun78 historical report of the Aerospace Rqmts Div (AWS/DNTR)--itself included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[105]Telephone conversation by author on 19Jul79 with Mr. Edwin B. Dickson, Science & Tech Div, Directorate of Aerospace Development

105(Cont) (AWS/DND), DCS Aerospace Sciences, HQ AWS. Mr. Dickson was HQ AWS' GOR monitor.

106Ltr Maj Charles A. Diaz, OL-C 5WW (asst staff weather officer to TRADOC), to 5WW (CC), "Unit Information Report - August 1978," 11Sep78, included as Sup Doc #2-1 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec78--itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec78.

107*Rowe Interview: Army Weather Support*, Jun78, pp. 45-47.

108AR 115-10/AFR 105-3, "Environmental Services: Meteorological Support for the U.S. Army," 9Jun70, p. 2-1.

109See, for example, AWSM 55-2, *Operations: Weather Support for Joint Force Operations*, 30Mar73, p. A6-1.

110Ltr Col David L. Roberts, ch, ops div, 5WW, to AWS (DO), "Tactical Weather Support Concepts - A Status Report," 8Jul75, included as Sup Doc #57 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun75.

111Msg 5WW (DOX) to Comdr USAICS (ATSI-CTD-MS-SWO), *et al.*, info Det 1, 16WS, *et al.*, "Recommended TOE Changes for Army Weather Support," 061800ZDec74, included as Sup Doc #52 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun75.

112"AWS Weather Service (AWS) Position on Army Weather Communications," n.d. (*circa* 1975), included within Sup Doc #40 to "History of 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 to "History of the 5th Weather Wing," Jan-Jun75.

113Ltr Lt Col Joseph W. Martin, Jr, ops officer, 16WS, to 5WW (DOXX), "Tactical Facsimile," 28Jan76, included as Sup Doc #4 to "History of 16th Weather Squadron," itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

114"History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, p. 3, included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

115Ltr Lt Col John F. Pohle, ch, ops and trng br (5WW/DOOT), ops div, HQ 5WW, to 5WS (DO), "FGC-25/25X Maintenance Problems," 27Oct77, included as Sup Doc #24 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec77.

116"Summary of REFORGER 76," and "Reforger 76 MSI Test Report," included as atchs to "History of 7th Weather Squadron," Jul-Dec76, itself included as Appendix II to "History of the 2d Weather Wing," Jul-Dec76.

117Memo Capt Thomas D. Accola, current ops off, 5WS, "Post REFORGER 76 Briefing of 101st ABD SWO," 27Oct76, included as Sup Doc #18 to "History of 5th Weather Squadron," Jul-Dec76, itself included as Appendix 4 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76.

[118]Ltr Lt Col Wilbert G. Maunz, ops officer, 7WS, to 2WW (DO), "Summary of WINTEX 77," 6May77, included as Atch 3 to "History of 7th Weather Squadron," Jan-Jun77, itself included as Appendix 2 to "History of the 2d Weather Wing," Jan-Jun77.

[119]"Post Exercise Critique: REFORGER 77," n.d., included as atch to "History of the 7th Weather Squadron," Jul-Dec77, itself included as Appendix 2 to "History of the 2d Weather Wing," Jul-Dec77.

[120]Vol I, *Narrative*, pp. 181-82, of *History of Air Weather Service*, 1976.

[121]Ltr Lt Col Dale C. Barnum, staff weather officer, 8th Army, to UNC/USFK/EUSA (CJ-TE-E), "Team Spirit 77 Post Exercise Report," 26Apr77, included within Sup Doc #52 of "History of the 1st Weather Wing," Jan-Jun77.

[122]"History of the 1st Weather Wing," Jul-Dec77, pp. 12-17; Jan-Jun78, pp. 11-12; and Jul-Dec78, pp. 17-18.

[123]Vol I, *Narrative*, pp. 232-33, of *History of Air Weather Service*, 1976.

[124]Msg 2WW (DOK) to AWS (SYCF), info 7WS (DO) and USCINCEUR (ECJ3-WE), "Army Weather Support (Facsimile)," 170916ZJan77.

[125]"History of the 2d Weather Wing," Jul-Dec77, pp. 5-6.

[126]TAC Concept Review, *A Tactical Weather Subsystem to Interface with USAF Global Weather System During 1970-1975* (Langley AFB VA: HQ TAC, 15Oct69), p. 1.

[127]"Summary of REFORGER 76," and "Reforger 76 MSI Test Report," included as atchs to "History of 7th Weather Squadron," Jul-Dec76, itself included as Appendix II to "History of the 2d Weather Wing," Jul-Dec76.

[128]Msg 2WW (DO) to AWS (SYCF), info 31WS (DOX), 7WS (DOX), and USEUCOM (ECJ3-WE), "Army Weather Support," 170917ZJan77, and msg 2WW (DO) to AWS (SYCF), info 7WS (DO) and 31WS (DO), "Army Weather Support Requirements," 111402ZMay77.

[129]Msg AWS (CS) to 2WW (DO), info 7WS (DO) and 31WS (DO), "Army Weather Support Requirements," 261830ZJul77, included as Sup Doc #7 in Vol II, "Supporting Documents," of this study.

[130]See: msg HQ USAF (KRC and PRW) to AWS (CS) and AFCS (CS, DO, and EP), "MSQ-10 Weather Intercept Van Requirements," 071200ZJun77; and msg HQ USAF (KRC and PRW) to AWS (CS) and AFCS (CS, DO, and EP), "Army Weather Support Requirements," 071230ZJun77--included together as Sup Doc #8 in Vol II, "Supporting Documents," of this study.

[131]Memo Lt Col Swayne, Army liaison officer to AWS, to Fuller, 4Apr79; telephone conversation by author on 20Jul79 with Maj Glenn W. McBride, assigned within DCS Ops Plans, HQ MAC. McBride gave the referenced briefing on 4Jun77 while assigned to HQ AWS.

[132]Vice the field army, in recognition of the Army's EAD decision of 1973 whereby the EAD corps would be the highest tactical element within any given theater of operations.

[133]Ltr and atch (AWS draft of AR 115-10/AFR 105-3, 13Dec77) Col Ramon C. Wilkins, ch of staff, AWS, to MAC (XPP), "AR 115-10/AFR 105-3, Weather Support to the US Army," 15Dec77; and ltr and atch (AWS draft of AR 115-10/AFR 105-3, 13Dec77) Col John D. Sims, Dir, Programming and Policy (MAC/XPP), DCS Plans, HQ MAC, to HQ USAF (PRW), "AR 115-10/AFR 105-3, Weather Support to the US Army," 17Jan78--both of which are included as supporting documents to this history.

[134]Ltr Lt Col Swayne, Army liaison officer to AWS, to TRADOC (AFTE), "Liaison Activities (RCS AFTE-2)," 7Apr78.

[135]Ltr Lt Col Swayne to TRADOC (ATFE), "Liaison Activities (RCS ATFE-2)," 5Jul78. See also ltr and 10 atch Capt Charles M. Russell, Exercise Purple Bare project officer, to 5WW (CC), "After Action Report, Exercise PURPLE BARE, 27-30 June 1978," 14Jul78, included as Sup Doc #68 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun78.

[136]Memo Lt Col Swayne to Fuller, 4Apr79. [137]*Ibid.*

[138]Ltr and 2 atch Lt Col Swayne to TRADOC (ATFE), "Liaison Activities (RCS AFTE-2)," 10Oct78.

[139]Ltr 2WW (DOX) to AWS (DO), "Tactical Weather Analysis Center (TWAC) Requirement," 13Sep78; ltr 2WW (DOK) to AWS (SY), "Tactical Weather Communications Support to US Army," 13Sep78; msg 2WW (DOX) to AWS (DOQ), info 1WW (DOX), 5WW (DOX), and AWS (SY), "Tactical Weather System," 141530ZSep78. See also ltr and atch (position paper Lt Col Glen A. Ryan, asst DCS Ops, HQ AWS, "Tactical Weather System," 31Oct78) Lt Col Wilbert G. Maunz, ch, Readiness Div (AWS/DOQP), Directorate of Rqmts, DCS Ops, HQ AWS, to 2WW (DOOT), "TWAC Training," 17Nov78, included as Sup Doc #4 to "History of the 2d Weather Wing," Jul-Dec78.

[140]For a good overview on how AWS envisioned using AWDS to support USAREUR see ltr and atch ("Concept of Operations in Support of USAREUR"), Col Hyko Gayikian, ch of staff, AWS, to 2WW (CC), "USAREUR Support for the Automated Weather Distribution System," 17May77, included as Sup Doc #9 in Vol II, "Supporting Documents," of this study.

[141]Vol I, *Narrative*, pp. 55-58, of *History of Air Weather Service*, 1976, and background paper, Col Salvatore R. LeMole, DCS Ops, AWS, "Maintenance Support Requirements," 31May77.

CHAPTER 6 - TOEs: SIGNAL OR INTEL "PROPONENCY"?

[1]See: 5WW, *Activities Report on US Army Weather Support, 1 April - 30 June 1970*, (FOUO) 15Jul70, p. 2, included as Sup Doc #2 to "History of the 5th Weather Wing," Apr-Jun70; and 5WW, *Activities Report on US Army Weather Support, 1 April - 30 June 1972*, (FOUO) 15Jul72, p. 4, included as Sup Doc #63 in Vol III of "History of the 5th Weather Wing," Jan-Jun72.

[2]Ltr and 2 atch Brig Gen William H. Best, Jr, comdr, AWS, to MAC (CC), "Recommendation for Award of the Air Force Outstanding Unit Award," n.d. (*circa* Mar72), pp. 4-5, included as Sup Doc #13 in

[2](Cont) Vol II of "History of the 5th Weather Wing," Jan-Jun72.

[3]5WS Reg 55-4, "Operations: Tactical Army Equipment and Training," 21Nov75, included as Appendix 8 to "History of the 5th Weather Squadron," Jul-Dec75, itself included as Appendix 4 in Vol I of "History of the 5th Weather Wing," Jul-Dec75.

[4]"Minutes of the 2d Joint Working Group Weather Support to the Army, Langley AFB, 22-23 Oct 74," included within Appendix 6 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[5]"History of the 5th Weather Wing," Jan-Jun75, p. 16.

[6]*Ibid.*, p. 18.

[7]Ltr McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, November 1974," 11Dec74, included within Appendix 11 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[8]Memo Col Walter R. Brett, comdr, 16WS, to TRADOC (ATCD-SC-I), "Review for Combat Intelligence-EAD," 7Jul75, included as Sup Doc #2 in "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[9]Ltr and atch Lt Col Joseph W. Martin, ops off, 16WS, to 5WW (DO), "Tactical Reconnaissance and Surveillance (TARS-75), Divisional Military Intelligence Company," 20Nov74, included as Sup Doc #52 in Vol 4 of "History of the 5th Weather Wing," Jul-Dec74.

[10]Ltr Col David L. Roberts, ch, ops div, 5WW, to 16WS (DO), "Tactical Reconnaissance and Surveillance (TARS-75), Divisional Intelligence Company," 12Dec74, included as Sup Doc #53, in Vol 4 of "History of the 5th Weather Wing," Jul-Dec74.

[11]Ltr Col Roberts to AWS (DO), "TARS-75 (AWS/DOQ Ltr, 27 Nov 74)," 20Dec74, included within Appendix 10 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[12]See: disposition form and atchs Maj Jimmie D. Auten, ch, ops br, 5WS, to DCSI (AFIN-RD) FORSCOM, "Evaluation of TARS-75 MI Organization," 23Oct75, included as Appendix 24 to "History of the 5th Weather Squadron," Jul-Dec75, itself included as Appendix 4 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec75; memo and atchs Maj Frederick, "Combat Intelligence Company Evaluation Report," 11Sep-75, included as Sup Doc #69 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[13]Ltr and 2 atch Col Cooke W. Leutwyler, Dir of Rqmts (AWS/DOQ), DCS Ops, AWS, to 1WW (DO), *et al.*, "Tactical Weather Support Concept Conference, 15-17 Sep 75," 24Oct75, included as Sup Doc #68 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[14]Ltr Maj McDonald, staff weather officer to CACDA, to 16WS (CC), "CAC Staff Weather Officer Activities Report, December 1975,"

[14](Cont) 6Jan76, included within Sup Doc #39 to "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[15]See ltr Capt R. E. Decker, ACG admin of, USACACDA, to TRADOC (ATCD-SIE), "Proponency for Meteorology Support Requirements," 17Feb76, atch to ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Unit Activity Letter, (February 1976)," 4Mar76, included within Sup Doc #9 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76; ltr Maj Dell V. McDonald, staff weather officer to USCACDA, to 16WS (CC), "CAC Staff Weather Officer Activities Report, January 1976," 5Feb76, included within Sup Doc #10 to "History of the 16th Weather Squadron," Jan-Jun76.

[16]Ltr Lt Col Owens to 16WS (CC), "Unit Activity Letter (March 1976)," 6Apr76, included within Sup Doc #9 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[17]Ltr Lt Col Owen Y. Macy, staff weather officer to USAICS, to 16WS (CC), "Unit Report - August," 10Sep76, included within Sup Doc #14 of "History of the 16th Weather Squadron," Jul-Sep76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76.

[18]Ltr Lt Col Macy to OL-C 5WW, "Unit Information Report," 7Mar77, included within Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun77, itself included as Appendix 1 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun77.

[19]Ltr Lt Col Macy to OL-C 5WW, "Unit Information Report," 2Nov77, included within Sup Doc #9 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[20]"History of the 5th Weather Squadron," Jul-Dec76, pp. 13-14, included as Appendix 4 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76; and "History of the 5th Weather Squadron," Jul-Dec77, p. 7, included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec77.

CHAPTER 7 - DIVISION SUPPORT: DIRECT OR INDIRECT?

[1]Background paper Col Robert M. Chamberlain, DCS Ops, HQ AWS, "Army Weather Support Concepts," 30Oct75, included within Sup Doc #47 in Vol II, "Supporting Documents," of *History of Air Weather Service*, 1Jul74-31Dec75 (S). Info used (U).

[2]See: ltr Maj McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, August 1974," 6Sep74, included within Appendix 11 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74; Ltr Maj McDonald to 16WS (CC),"CACDA Staff Weather Officer Activities Report, November 1974," 11Dec74, included within Appendix 11 to "History of the 16th Weather Squadron," Jul-Dec74.

[3]Ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (DOX), "MASSTER Test FM 286," 18Feb75, included as Sup Doc #7 to "History of the 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun75.

[4]Ltr Maj McDonald to 16WS (CC), "End-of-Test Report on Weather Support Concept for MASSTER Test, FM 286, Division Command Post Test," 31Jan75, included as Sup Doc #53 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun75.

[5]Ltr Maj McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, February 1975," 4Mar75, included within Sup Doc #40 to "History of the 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun75.

[6]Ltr Maj McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, March 1975," 4Apr75, included within Sup Doc #40 of "History of the 16th Weather Squadron," Jan-Jun75.

[7]Ltr Maj McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, April 1975," 6May75, included within Sup Doc #40 of "History of the 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun75.

[8]Ltr Maj McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, June 1975," 8Jul75, included within Sup Doc #40 of "History of the 16th Weather Squadron," Jan-Jun75.

[9]See: ltr and atch ("FM 286 Background Paper") Col Wesley E. Robb, ch, ops, div, 5WW, to AWS (DO), "Weather Support to DTOC Under the FM 286 Concepts," 28Aug75, included as Sup Doc #66 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75; ltr Maj McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, August 1975," 3Sep75, included within Sup Doc #39 of "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[10]Ltr and 2 atch Col Cooke W. Leutwyler, Dir of Rqmts (AWS/DOQ), DCS Ops, HQ AWS, to 1WW (DO), *et al.*, "Tactical Weather Support Concept Conference, 15-17 Sep 75," 24Oct75, included as Sup Doc #68 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[11]Ltr Lt Col Joseph W. Martin, ops of, 16WS, to 5WW (CV and DO), "IAG Representative Information," 24Sep75, included as Sup Doc #32 in "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[12]Ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Unit Activity Letter (September 1975)," 15Oct75, included within Sup Doc #38 to "History of the 16th Weather Squadron," Jul-Dec75.

[13]Ltr Capt Frederick F. Haddad, Jr, asst plans off, 5WW, to 5WW (DO, CV, and CC), "5WW/AWS IAG Trip Report," 11Nov75, included as Sup Doc #67 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[14]*Ibid.*

[15]*Ibid.*

[16] *Ibid.*

[17] *Ibid.*

[18] Ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (CC), "Unit Activity Report/Atch 1," 20Oct75, included within Sup Doc #37 to "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[19] Ltr Lt Col Martin to 5WW (DO), "Division OWT Location," 31Oct75, included as Sup Doc #91 to "History of the 16th Weather Squadron," Jul-Dec75.

[20] Ltr Col Wesley E. Robb, ch, ops div, 5WW, to 16WS (DO), "OWT Location (Your Ltr, 31 Oct 75)," 19Dec75, included as Sup Doc #42 to "History of the 16th Weather Squadron," Jul-Dec75. See also Col Walter R. Brett, comdr, 16WS, "Fact Sheet," 2Jan76, included as Sup Doc #2 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[21] Ltr McDonald to 16WS (CC),"CAC Staff Weather Officer Activities Report, October 1975," 6Nov75, included within Sup Doc #39 of "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[22] See: point paper, Col Anthony P. Simkus (acting dir, C&C Directorate, CACDA) to CACDA (dep comdr), "Trip Report: Third JWG Weather . . . ," 28Jan76, atch to ltr McDonald to 16WS (CC), "CAC Staff Weather Officer Activities Report, January 1976," 5Feb76, included within Sup Doc #10 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76; and "Minutes of the Third Joint Working Group (JWG) for Weather Support to the US Army, Fort Huachuca, AZ 20-21 Jan 76," included as Sup Doc #75 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76.

[23] Ltr Col Walter R. Brett, comdr, 16WS, to TRADOC (DCSCD), "Division Weather Support," 2Jan76, included as Sup Doc #1 to "History of the 16th Weather Squadron," Jan-Jun76.

[24] Ltr and atch "(Division Weather Support") Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (DO), "COMAC Information Papers," 8Dec75, included as Sup Doc #24 to "History of the 16th Weather Squadron," Jul-Dec75.

[25] See p. 19 herein.

[26] "History of the 16th Weather Squadron," Jan-Jun76, pp. 3-4.

[27] See: ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Unit Activity Letter (January 1976)," 10Feb76, included within Sup Doc #8 of "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76; ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (CC),"Unit Information Report, RCS: 5WW/DO(M)7203," 12Mar76, included within Sup Doc #11 of "History of the 16th Weather Squadron," Jan-Jun76.

[28]See: ltr Lt Col Macy, OL-A 5WW, to OL-C 5WW, "Unit Information Report (RCS: 5WW-DO (M) 7203)," 7Mar77; ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW-DO (M) 7203)," 6Apr77; and ltr Macy to OL-C 5WW,"Unit Information Report (RCS: 5WW-DO (M) 7203)," 30Jun77, all included within Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun77; and ltr Lt Col Darrell T. Holland, OL-E 5WW, to OL-C 5WW, "Unit Information Report - July 1977," 4Aug77, included within Sup Doc #11 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[29]Ltr Col Norman S. Wells, Directorate of Intelligence Systems (DAMI-TST), Dept of the Army, to HQ USAF (XOOTF), "Direct Weather Service Support to Army Units Below Division," 26Jan79, included as Sup Doc #10 in Vol II, "Supporting Documents," of this study.

CHAPTER 8 - ARMY REQUIREMENTS

[1]Army Regulation 115-12, "US Army Requirements for Weather Service Support," 12Feb70. The scope of that regulation was expanded in a 1Dec77 revision to include the submission of SORs by Army National Guard and Reserve units.

[2]Ltr and 2 atch Col Cooke W. Leutwyler, Dir of Rqmts (AWS/DOQ), DCS Ops, AWS, to 1WW (DO), *et al.*, "Tactical Weather Support Concept Conference, 15-17 Sep 75," 24Oct75, included as Sup Doc #68 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[3]See: "History of the Assistant for Weather, DCS Programs & Resources, Headquarters, USAF," Jan-Jun76, p. 19; "History of the 16th Weather Squadron," Jul-Sep76, p. 5, included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76; and background paper, Maj Gen John W. Collens, DCS Plans, HQ MAC, "Processing of US Army Statement of Requirements (SOR) for Direct Weather Service Support," 18Jan77.

[4]Fuller, "Text of Interview With Brigadier General William H. Best, Jr, (Commander of Air Weather Service)," 19-20Jun73, pp. 34-39, included as Sup Doc #1 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[5]In March 1975, the 16WS operations officer wrote that "Army weather requirements . . . [in] SORs . . . are still basically prepared by Air Force weather personnel." See ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (DO), "Reevaluation of Stating Army Weather Support Capabilities/Requirements," 4Mar75, included as Sup Doc #10 in "History of the 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun75.

[6]*Rowe Interview: Army Weather Support*, pp. 5-10, included as Sup Doc #4 in Vol II, "Supporting Documents," of this history.

[7]See: background paper Maj John G. Cates, Dir of Programs & Long Range Planning (AWS/XPX), DCS Plans, HQ AWS, "Candidate Capability Problem," 23Oct70; DCS Ops, HQ AWS, "Semiannual Report of Activities,"

[7](Cont) Jan-Jun70, included as Tab 9 in Vol IV, "Supplements," of "History of Air Weather Service," 1Jul69-30Jun70 (S). Info used (U); "History of the 5th Weather Wing," 1Apr-30Jun70, p. 14; "History of the 16th Weather Squadron," 1Apr-30Jun70, p. 6B; HQ 5WW, *Activities Report on US Army Weather Support, 1 Apr - 30 Jun 70,* (FOUO), 15Jul70, p. 1, included as Sup Doc #2 to "History of the 5th Weather Wing," 1Apr-30Jun70; and HQ 5WW, *Activities Report on US Army Weather Support, 1Jan-31Mar72* (FOUO), p. 1, included as Sup Doc #62 in Vol III of "History of the 5th Weather Wing," Jan-Jun72.

[8]See: fact sheet, "Tactical Environmental Support System (TESS) Study, ACN 18284," 16Nov73, included as Sup Doc #11 in "History of the 16th Weather Squadron," Jul-Dec73, itself included as Appendix E in Vol 1 of "History of the 5th Weather Wing," Jul-Dec73; and HQ 5WW, *Activities Report on US Army Weather Support, 1Oct-31Dec71* (FOUO), 14Jan72, p. 3, included as Sup Doc #20 to "History of the 5th Weather Wing," Jul-Dec71.

[9]HQ TAC *Activities Report on Tactical Weather Systems/Equipment, 1Apr-30Jun74* (FOUO), 15Jul74, p. 1, included as Sup Doc #45 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun74.

[10]See coordination draft of Vol 1, *Executive Summary*, of USAICS, TRADOC, U.S. Army, *Tactical Environmental Support System (TESS) Study*, ACN 18284, Aug74, included as Appendix 4 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[11]Ltr Owens to Dep Commandant for Combat and Trng Development, USAICS, "Trip Report - LtC Owens and Maj Miller," 16Aug74, included within Appendix 10 to "History of the 16th Weather Squadron," Jul-Dec74.

[12]Ltr McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, September 1974," 1Oct74, included within Appendix 11 to "History of the 16th Weather Squadron," Jul-Dec74.

[13]Ltr McDonald to 16WS (CC), "CACDA Staff Weather Officer Activities Report, May 1975," 10Jun75, included within Sup Doc #40 to "History of the 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun75.

[14]Ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (CC), "Unit Information Report, RCS: 5WW-DO(M) 7203," 12Sep75, included within Sup Doc #37 to "History of the 16th Weather Squadron," Jul-Dec75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec75.

[15]"History of the 5th Weather Wing," Jul-Dec75, p. 20. See also: ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (DO), "Tactical Environmental Support System (TESS) Study Approved," 8Oct75, included as Sup Doc #16 to "History of the 16th Weather Squadron," Jul-Dec75; fact sheet, "Tactical Environmental Support System (TESS) Study, ACN 18284M," 11May76, included within Sup Doc #9 of "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

16 Ltr Lt Col Martin to 5WW (CC), "Unit Information Report, RCS: 5WW-DO(M)7203," 28Nov75, included within Sup Doc #37 to "History of the 16th Weather Squadron," Jul-Dec75.

17 Ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Unit Activity Letter (March 1976)," 6Apr76, included within Sup Doc #9 to "History of the 16th Weather Squadron," Jan-Jun76; ltr Maj McDonald, staff weather officer to CACDA, to 16WS (CC), "CAC Staff Weather Officer Activities Report, March 1976," 5Apr76, included within Sup Doc #10 to "History of the 16th Weather Squadron," Jan-Jun76.

18 Ltr Lt Col Martin to 5WW (DOX), "MAP/SAMSR," 8Apr76, included as Sup Doc #6 to "History of the 16th Weather Squadron," Jan-Jun76.

19 Ltr McDonald to 16WS (CC) "CAC Staff Weather Officer Activities Report, June 1976," 6Jul76, included within Sup Doc #10 of "History of the 16th Weather Squadron," Jan-Jun76.

20 See Vol 1, *Executive Summary*, Mar76, and Vol 2, *Main Report* (C), Feb76, of USAICS, TRADOC, Dept of the Army, *Tactical Environmental Support System (TESS) Study*, ACN 18284. Info used (U). The *Executive Summary* is included as Sup Doc #11 in Vol II, "Supporting Documents," of this history.

21 Ltr and atch (TRADOC's draft MAP/SAMSR) Lt Col J. M. Larkins, asst adjutant gen, TRADOC, to HQ Dept of the Army (DAMO-RQ, *et al.*), *et al.*, "Joint Army/Air Force Master Plan for the Satisfaction of Army Meteorological Support Requirements (MAP/SAMSR), USATRADOC ACN 24546," 30Aug77, included as Sup Doc #12 in Vol II, "Supporting Documents," of this history.

22 Ltr and 2 atch (AWS' proposed rewrite of MAP/SAMSR, and "Additional Proposals,") Col Salvatore R. LeMole, DCS Ops, HQ AWS, to MAC/XPPE, "Joint Army/Air Force Master Plan for the Satisfaction of Army Meteorological Support Requirements (MAP/SAMSR), USATRADOC ACN 24546," 15Nov77, included as Atch 2 to Readiness Div (AWS/DOQP), Directorate of Rqmts, DCS Ops, HQ AWS, "Semiannual Report of Activities," Jul-Dec77, itself included within the "Supplements" volumes to the *History of Air Weather Service*, 1977.

23 Ltr Col John D. Sims, Director, Programming and Policy (MAC/-XPP), DCS Plans, HQ MAC, to HQ USATRADOC (ATCD-SE), "Joint Army/-Air Force Master Plan for Satisfaction of Army Meteorological Support Requirements (MAP/SAMSR), USATRADOC ACN 24546," 20Jan78, included as Sup Doc #11 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun78.

24 Ltr Lt Col J. M. Larkins, asst adjutant general (ATCD-IE-R), TRADOC, to Dept of the Army (DAMI-RO), "Master Plan for the Satisfaction of Army Meteorological Support Requirements (MAP/SAMSR, USATRADOC ACN 24546)," 23Jan78, included as Sup Doc #12 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78.

25 Ltr Lt Col Darrell T. Holland, staff weather officer to CACDA, to 16WS (CC), "Critique of Allied Officer Preparatory Course," 24Aug76, included as Sup Doc #6 to "History of the 16th Weather Squadron," Jul-Sep76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76.

[26]Msg CAC (ATCA-CFC (B)) to TRADOC (ATCD-SIE), *et al.*, info AFGL and ESD, "Army Tactical Commander's Weather Requirements Conference," 020144ZAug77.

[27]Ltr and 10 atch Capt Roger A. Schjeldahl, asst adjutant gen, CAC, to Dept of the Army (DAMI-TST-I), *et al.* "Army Tactical Commander's Weather Requirements Conference," 20Sep77, included as Sup Doc #28 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec77.

[28]*Ibid.* [29]*Ibid.*

[30]Ltr Capt Schjeldahl to CINCUSAREUR, *et al.*, "Tactical Requirements for Weather Support," 25Nov77, included as Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun78.

[31]Ltr Holland to OL-C 5WW, "Unit Information Report - August 1977," 2Sep77, and ltr Holland to OL-C 5WW, "Unit Information Report - November 1977," 7Dec77, both included within Sup Doc #11 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[32]Ltr Lt Col Holland to OL-C 5WW, "Unit Information Report - February 1978," 6Mar78, and ltr Holland to OL-C 5WW, "Unit Information Report - May 1978," 6Jun78--included as Sup Docs #19-2 and 19-9, respectively, to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun78; ltr Holland to OL-C 5WW, "Unit Information Report - August 1978," 1Sep78, ltr Holland to OL-C 5WW, "Unit Information Report - October 1978," 6Nov78, and ltr Holland to OL-C 5WW, "Unit Information Report - December 1978," 8Jan79--included as Sup Docs 3-1, 3-3, and 3-5, respectively, in "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec78.

[33]Ltr Swayne to Mr. Beck, Dept of the Army (DAMI-TST-I), "Army Weather Support," 22Dec77, included as Sup Doc #6 in Vol II, "Supporting Documents," of this study.

[34]"AWS Support Evaluation of USAREUR Weather Requirements," n.d. (*circa* May78), included as Atch 4 to Readiness Div (AWS/DOQX), Directorate of Rqmts, DCS Ops, HQ AWS, "Semiannual Report of Activities," Jul-Dec78, itself included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[35]Ltr and 2 atch Swayne to TRADOC (AFTE-2), "Liaison Activities (RCS AFTE-2)," 10Oct78.

[36]Ltr Swayne to TRADOC (AFTE), "Liaison Activities (RCS AFTE-2)," 1Mar79.

[37]Msg Dept of the Army (DAPE-GO) to AIG 7405, *et al.*, "General Officer Announcements," 161600ZApr79.

[38]Vol I, p. 6, of "History of the 5th Weather Wing," Jan-Jun75.

[39]Ltr Col Cooke H. Leutwyler, Dir of Rqmts (AWS/DOQ), DCS Ops, HQ AWS, to MAC (XPMRZ), "US Army Requirements for Direct Weather Service Support (Fort Knox KY and Fort Indiantown Gap PA)," 5Jan76.

[40]Ltr Col William E. Harris, dep dir, Programming & Policy (MAC/XPP), DCS Plans, HQ MAC, to HQ USAF (PRW), "AWS Support to Army Reserve (ARes) and Army National Guard (NG) - Army Reserve Components," 16Jan76.

[41]Vol I, *Narrative*, pp. 1-16, of *History of Air Weather Service*, 1976 (S). Info used (U).

[42]Ltr Col Cummins, AF/PRW, to Dept of the Army (DAMI-TSI), "Direct Weather Support Requirements (Muir AAF, PA)," 9Apr76.

[43]Memo Carlton to Rowe, 21May76.

[44]Vol I, *Narrative*, pp. 72-73, of *History of Air Weather Service*, 1976 (S). Info used (U).

[45]*Ibid.*, 73-74.

[46]Ltr Col James S. Kennedy, asst DCS Ops, HQ AWS, to MAC (XPPE), "TIG Functional Management Inspection of Weather Support for Reserve Units, 14Jul75-30Apr76, PN 76-603," 22Nov76.

[47]Memo for record, Maj John J. Kelly, Environmental Svcs Div (MAC/XPPE), Directorate of Programming and Policy, DCS Plans, HQ MAC, "Visit to HQ USAF/P W," 15Feb77.

[48]Ltr and atch (position paper, "AWS Army Reserve Component--ARC--Support Policy," with 1 atch, "AWS Position") Col Norman F. Rauscher, asst DCS Ops, HQ AWS, to 1WW (DO), *et al.*, "AWS Army Reserve Component (ARC) Support Policy," 10Nov77, included as Sup Doc #13 in Vol II, "Supporting Documents," of this study.

[49]*Ibid.*

[50]Col Ramon C. Wilkins, chairman, AWS Council, report of 12 and 14Dec77 mtg, "Review and Document Policy on Army Reserve Component Weather Support," with 2 atch: "AWS Position on Army Reserve Component (ARC) Support," and "Estimated Cost of Implementing AWS Policy on ARC Support." This report, together with others addressing the AWS Council and Program Review Committee meetings of 1977, are included together as Sup Doc #4 in Vol II, "Supporting Documents," of *History of Air Weather Service*, 1977.

[51]Ltr without atch (see *ibid.*) Col Salvatore R. LeMole, DCS Ops, HQ AWS, to MAC (XPP), "Weather Support to Army Reserve Component (ARC)," 5Jan78.

[52]See: msg Hall to Collens, "Weather Services to Muir Army Airfield," 091400ZMay78; msg Collens to Hall, "Weather Services to Muir Army Airfield," 232330ZMay78; ltr Hall to Collens, 9Jun78; and ltr Brig Gen Rowe to MAC (XPPE), "Weather Service to Muir AAF," 14Jul78.

[53]At the same time MAC and AWS were processing the Muir SOR, they were deliberating over an SOR for Fort Drum, New York--

53(Cont) which, while an active duty FORSCOM post, principally served Army reserve components. There too, active duty AWS personnel were assigned in 1978, and the additional manpower spaces were provided by the Air Staff. See: Vol 1, "History of the 3d Weather Wing," Jan-Jun77, pp. 22-23; Vol 1, "History of the 3d Weather Wing," Jul-Dec77, pp. 26-27; and Vol 1, "History of the 3d Weather Wing," Jan-Jun78, pp. 26-27.

54Ltr Col LeMole, vice comdr, AWS, to MAC (XPPE), "Weather Service to Muir AAF," 13Oct78.

55Directorate of Trng (AWS/DOT), DCS Ops, HQ AWS, "Report of Activities," Jul-Dec78, pp. 2-3; Readiness Div (AWS/DOQP), Directorate of Rqmts, DCS Ops, HQ AWS, "Semiannual Report of Activities," Jan-Jun78, pp. 4-5, and Jul-Dec78, pp. 2-3--each document included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

56Directorate of Tng (AWS/DOT), DCS Ops, HQ AWS, "Report of Activities," Jan-Jun78, p. 3, included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

57Ltr Col Walter R. Brett, staff weather officer to TRADOC, to 5WW (CC), "Unit Activity Report (RCS: 5WW/DOO (M) 7203)," 11Jan77, included within Sup Doc #9 to "History of the 16th Weather Squadron," Jul-Dec76.

58Ltr Maj Charles A. Diaz, asst staff weather officer to TRADOC, to 5WW (CC), "Unit Information Report - August," 14Sep77, included within Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

59Ltr Lt Col Holland, staff weather officer to CACDA, to OL-C 5WW, "Unit Information Report - August 1977," 2Sep77, included within Sup Doc #11 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77.

60Ltr Maj Diaz, asst staff weather officer to TRADOC, to 5WW (CC), "Unit Information Report - April 1978," 15May78, included as Sup Doc #18-6 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun78. See also: ltr Lt Col Macy, staff weather officer to USAICS, to OL-C 5WW, "Unit Information Report (RCS: 5WW DO(M) 7203)," 1Sep78; ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW DO(M) 7203)," 6Dec78; and ltr Col Cummins, staff weather officer to TRADOC, to 5WW (CC), "Unit Information Report - October 1978," 17Nov78--included as Sup Docs #1-1, 1-4, and 2-3, respectively, to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec78.

61Msg TRADOC (ATCH-SIE) to Heersamp (US Verbofez), Cologne, info Dept of Army (DAMI-FLA and DAMT-TSI), *et al.*, "Weather Service Interoperability," 031919ZJun76, included as Sup Doc #79 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76.

62See "AWS NATO Policy Implementation," attached to rpt, Col Ramon C. Wilkins, chairman, AWS Council, "Report of HQ AWS Council

[62](Cont) Meeting," 12Jul78, included as Atch 2 to Readiness Div (AWS/DOQP), Directorate of Rqmts, DCS Ops, HQ AWS, "Semi-annual Report of Activities," Jul-Dec78, itself included within the "Supplements" volumes to *History of Air Weather Service*, 1978.

[63]AR 115-10/AFR 105-3, "Environmental Services: Meteorological Support for the U.S. Army," 9Jun70, pp. 1-1 and 1-2.

[64]*Rowe Interview: Army Weather Support*, pp. 1-21, included as Sup Doc #4 in Vol II, "Supporting Documents," of this history.

[65]Ltr Maj Gen R. H. Groves, ch of staff, USAREUR, to HQ Dept of the Army (DAMI-TST-I), *et al.*, "Forward Area Limited Observing Program (FALOP)," 29Nov76, included as Sup Doc #14 in Vol II, "Support Documents," of this history.

[66]Ltr Rowe to CINCUSAREUR, "Forward Area Limited Observing Program (USAREUR Reg 381-2)," 1Jul77.

[67]Ltr Rowe to HQ USAF (PRW), "Forward Area Limited Observation Program (USAREUR Ltr, 29 Nov 76)," 20Jan77, included as Sup Doc #15 in Vol II, "Supporting Documents," of this study.

[68]Ltr and atch (staff study rpt, Col Brett, "Army-Wide Forward Area Limited Observation Program--FALOP) Col Brett, staff weather officer to TRADOC, to 5WW (DO), "Army-Wide Forward Area Limited Observation Program (FALOP)," 12Jun78, included as Sup Doc #8 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of 5th Weather Wing," Jan-Jun78.

[69]Ltr Col Cummins, staff weather officer to TRADOC, to 5WW (CC), "Unit Information Report - September 1978," 15Oct78, included as Sup Doc #2-2 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec78.

[70]Msg 30WS (DON) to 1WW (DO), Det 15 30WS, and Det 10 30WS, info AWS (DO), *et al.*, "FALOP Implementation," 160709ZMay78.

[71]"Post Exercise Critique: REFORGER 77," n.d., included as atch to "History of the 7th Weather Squadron," Jul-Dec77, itself included as Appendix 2 to "History of the 2d Weather Wing," Jul-Dec77.

[72]Msg 2WW (DO) to AWS (DO), "AWS Army Support Policy," 281425Z-Nov77; ltr Mr. Warren K. Mahoney, Dir, Comm Rqmts (AWS/SYC), DCS Systems, HQ AWS, to HQ AWS (DOU), "AWS Standardized FALOP Code," 31Oct78.

CHAPTER 9 - CONCEPTS, POLICY, AND DOCTRINE

[1]Fuller, "Text of Interview With Brigadier General William H. Best, Jr (Commander of Air Weather Service," 19-20Jun73, p. 37, included as Sup Doc #1 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[2] *Ibid.*

[3] Vol I, "Narrative," p.332, of "History of Air Weather Service," 1Jul70-30Jun71.

[4] Telephone interview by author with Cummins on 19-20Jun78, and personal discussion by author with Cummins on 22-23Jun78.

[5] *Rowe Interview: Army Weather Support*, pp. 32-34, included as Sup Doc #4 in Vol II, "Supporting Documents," of this study.

[6] Ltr Lt Col Thomas W. Fuller, Ch, Tac Intel Div (DAMI-TST), Dir of Tac/Strat Intel, Dept of the Army, to FORSCOM (AFIN-R), *et al.*, info HQ USAF (PRW), MAC (XPPE), and AWS (DO), "Review of Requirements for Direct Weather Service Support (AR 115-12)," 30Nov76.

[7] Ltr Lt Col Fuller, Dept of the Army (DAMI-TST), to HQ USAF (PRW), "US Army Requirements for Direct Weather Service Support," 18Feb77.

[8] Ltr Col Cummins, AF/PRW, to MAC (XPMRZ), "US Army Requirements for Direct Weather Service Support," 28Feb77.

[9] *Rowe Interview: Army Weather Support*, pp. 31-32.

[10] Vol I, "Narrative," p. iv, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[11] *Ibid.*, pp. 252-73, and Vol I, *Narrative*, pp. 8-9, of *History of Air Weather Service*, Jul74-31Dec75 (S). Info used (U).

[12] Vol I, "Narrative," p. 226, of "History of Air Weather Service, 1Jul72-30Jun74 (S). Info used (U).

[13] Memo for record, Maj John J. Kelly, Environmental Svcs Div (MAC/XPPE), Directorate of Programming and Policy, DCS Plans, HQ MAC, "Visit to HQ USAF/PRW," 15Feb77. See also memo Lt Col Richard A. Rinaldi, MAC/XPPE, to MAC (XPP), "Visit to USAF/PRW, 7-9Feb77," 15Feb77.

[14] HQ 5WW, *Activities Report on US Army Weather Support, 1 Jan-31 Mar 1971* (FOUO), 15Apr71, p. 1, included as Sup Doc #4 to "History of the 5th Weather Wing," Jan-Mar71.

[15] Fuller, "Text of Interview With Brigadier General William H. Best, Jr (Commander of Air Weather Service," 19-20Jun73, p. 36, included as Sup Doc #1 in Vol II, "Supporting Documents," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[16] Vol I, "Narrative," pp. 127, 137, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[17] Conversation by author with Rowe on 26 and 28Jun78.

[18] Point paper Col Rauscher, asst DCS Ops, HQ AWS, "AWS Manpower/-Manning (AWS/CC Testimony on H.R, 8762)," 22May78.

[19] *Rowe Interview: Army Weather Support*, pp. 22-23.

[20] *Ibid.*, 1-2 [21] *Ibid.*, 23-24.

[22] Text of "5WW Briefing - Army Support Conference," pp. 1, 13, included as Sup Doc #6 in "History of the 5th Weather Wing," Jan-Mar71.

[23] "History of the 16th Weather Squadron," Jul-Dec74, pp. 12-14, included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[24] Ltr and atch Zapinski to 16WS and OL-D 16WS, "U.S. Army Weather Support," 6Dec74, included as Sup Doc #51 in Vol 4 of "History of the 5th Weather Wing," Jul-Dec74.

[25] Brochure, "5 Weather Wing Commander's Conference, 3-4 December 1974," included as Sup Doc #79 in *Ibid.*

[26] Ltr and atch Col David L. Roberts, ch, ops div, 5WW, to 5WS (CC), *et al.*, "Army Weather Support - Where Are We 13Jun75, included as Sup Doc #56 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun75.

[27] *Rowe Interview: Army Weather Support,*, pp. 34-35, included as Sup Doc #4 in Vol II, "Supporting Documents," of this study.

[28] Ltr and 5 atch Col Roberts, ch, ops div, 5WW, to AWS (DO), "Tactical Weather Support Concept - A Status Report," 8Jul75, included as Sup Doc #57 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun75.

[29] Ltr and 2 atch Col Cooke W. Leutwyler, Dir of Rqmts (AWS/DOQ), DCS Ops, HQ AWS, to 1WW (DO), *et al.*, "Tactical Weather Support Concept Conference, 15-17 Sep 75," 24Oct75, included as Sup Doc #68 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec75.

[30] Text of briefing by Maj Carl H. Chesley, HQ AWS, "Tactical Weather Support," included as pages 97-102 within Sup Doc #47 in Vol II, "Supporting Documents," of *History of Air Weather Service*, 1Jul74-31Dec75, (S). Info used (U).

[31] Vol I, *Narrative*, pp. 322-23, of *History of Air Weather Service*, 1Jul74-31Dec75 (S). Info used (U).

[32] See: AWSM 55-2, *Operations: Weather Support for Joint Force Operations*, 30Mar73; Change 1 to it dated 30Nov73; and Change 2, dated 28Jan74--included together as Sup Doc # 15 in Vol II, "Supporting Documents," of this study.

[33] See: AWSR 55-2, "Operations: AWS Tactical Weather Support," 31Aug77; and Change 1 to it, dated 27Mar78--included together as Sup Doc #16 in Vol II, "Supporting Documents," of this study.

[34] U.S., Congress, House, Subcommittee on Dept of Def of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for 1972*, 92d Cong, 1st Sess, Pt 1, 1971, pp. 552-53.

[35] Army Field Manual 100-5, *Operations*, 1Jul76.

[36]Lawrence J. Kolb, *The Joint Chiefs of Staff: The First Twenty-five Years* (Bloomington, IN: Indiana University Press, 1976), pp. 47-49.

[37]U.S., Congress, Senate, Subcommittee of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for Fiscal 1979*, 95th Cong, 2d Sess, Pt 5, 1978, p. 540.

[38]Army Field Manual 100-5, *Operations*, 1Jul76.

[39]U.S., Congress, Senate, Subcommittee of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for Fiscal 1979*, 95th Cong, 2d Sess, Pt 4, 1978, pp. 561, 565; and U.S., Congress, Senate, Subcommittee of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for Fiscal 1978*, 95th Cong, 1st Sess, Pt 4, 1977, p. 55.

See also: Edgar Ulsamer, "The USSR's Military Shadow is Lengthening," *Air Force*, Vol 60, No 3 (Mar77), pp. 44-45; Ulsamer, "The Accelerating Momentum of Soviet Military Might," *Air Force*, Vol 61, No 3 (Mar78), pp. 34-41; "The United States amd the Soviet Union," pp. 64-70, and "The Theater Balance Between NATO and the Warsaw Pact," pp. 111-16, in *Air Force*, Vol 61, No 12 (Dec78); Ulsamer, "World Hegemony Through Military Superiority," pp. 40-47, and William Schneider, Jr, "Trends in Soviet Frontal Aviation," pp. 76-81, in *Air Force*, Vol 62, No 3 (Mar79).

[40]*Ibid;* U.S., Congress, Senate, Subcommittee of the Committee on Appropriations, *Hearings, Department of Defense Appropriations for Fiscal 1978* 95th Cong, 1st Sess, Pt 5, 1977, pp. 618-31, 663.

[41]Ltr Col Walter R. Brett, OL-C 5WW, to 5WW (DN and DOXX), "The Importance of Smoke on the Modern Battlefield," 14Feb77.

[42]Ltr Maj Dell V. McDonald, staff weather officer to CACDA, to 5WW comdr, "Recommended TOE Changes for Army Weather Support," 31Dec74, included within Sup Doc #11 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[43]"Minutes of the Third Joint Working Group (JWG) for Weather Support to the US Army, Fort Huachuca, AZ 20-21 Jan 76," included as Sup Doc #75 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76.

[44]Ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to OL-E 16WS, "Concept of Centralized Support for Tactical Army Forces," 14Jan76, included as Sup Doc #3 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[45]Army Field Manual 100-5, *Operations*, 1Jul76, on file in the AWS historical archives.

[46]*Ibid.*, p. 7-4.

[47]Dept of Army Form 2496, *Action Trip Report*, Maj Dell V. McDonald, staff weather officer to CACDA, to CACDA dep comdr, "Army/Air Force Weather Conference (20Feb74)," 25Feb74, included as Sup Doc #7 to "History of the 16th Weather Squadron," Jan-Jun74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun74.

[48]Col Joseph D. Saccone, (Asst DCS Ops, HQ AWS) and Mr. John A. Lockerd (Technical Director, CACDA), "Minutes of the 1st Joint Working Group on Weather Support to the Army," n.d. (*circa* May74), included within Sup Doc #8 to "History of the 16th Weather Squadron," Jan-Jun74.

[49]"Minutes of the 2d Joint Working Group Weather Support to the Army, Langley AFB, VA 22-23Oct 74," included within Appendix 6 to "History of the 16th Weather Squadron," Jul-Dec74, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec74.

[50]See: Ltr and atch Maj McDonald, staff weather officer to CACDA, to 16WS (CC), "CACDA Staff Weather Officer Report, December 1974," 3Jan75, included within Sup Doc #40 to "History of the 16th Weather Squadron," Jan-Jun75, itself included as Appendix 7 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun75; ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Training Letters," 24Jun75, included as Sup Doc #31 to "History of the 16th Weather Squadron," Jan-Jun75.

[51]Ltr Lt Col Joseph W. Martin, Jr, ops off, 16WS, to 5WW (CC), "Unit Information Report, RCS: 5 WW-DO(M)7203," 30Jan76, included within Sup Doc #11 to "History of the 16th Weather Squadron," Jan-Jun-76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[52]See: "Minutes of the Third Joint Working Group (JWG) for Weather Support to the US Army, Fort Huachuca, AZ 20-21 Jan 76," included as Sup Doc #75 in Vol 3 of "History of the 5th Weather Wing," Jan-Jun76; point paper, Col Anthony P. Simkus (acting dir, C&C Directorate, CACDA) to CACDA (dep comdr), "Trip Report; Third JMG Weather . . .," 28Jan76, atch to ltr Maj McDonald to 16WS (CC), "CAC Staff Weather Officer Activities Report, January 1976," 5Feb76, included within Sup Doc #10 to "History of the 16th Weather Squadron," Jan-Jun76.

[53]A copy of AWSP 50-6, dated 11Aug76, is included as Sup Doc #89 in Vol III, "Supporting Documents," of *History of Air Weather Service*, 1976 (S). Info used (U).

[54]Vol I, *Narrative*, pp. 184-87 of *History of Air Weather Service*, 1976 (S). Info used (U).

[55]Directorate of Rqmts (AWS/DOQ), DCS Ops, HQ AWS, "Semiannual Report of Activities," Jul-Dec76, pp. 2, 7-8, included within Tab 2 in Vol IV of *ibid*.

[56]See: "Summary of REFORGER 76," and "Reforger 76 MSI Test Report," included as atchs to "History of the 7th Weather Squadron," Jul-Dec76, itself included as Appendix II to "History of the 2d Weather Wing," Jul-Dec76; Capt Thomas D. Accola, current ops off, 5WS, "Post REFORGER 76 Briefing of 101st ABD SWO," 20Oct76, included as Sup Doc #18 to "History of the 5th Weather Squadron," Jul-Dec76, itself included as Appendix 4 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76.

[57]"Post Exercise Critique: REFORGER 77," n.d., included as atch to "History of the 7th Weather Squadron," Jul-Dec77, itself included as Appendix 2 to "History of the 2d Weather Wing," Jul-Dec77.

[58]Ltr Lt Col Peter J. Britos, ops officer, 7WS, to 2WW (DN), "REFORGER 78 Weather Impact Indicator (WII) Evaluation Program," 1Dec78, included as Sup Doc #6 to "History of the 7th Weather Squadron," Jul-Dec78, itself included as Appendix 2 to "History of the 2d Weather Wing," Jul-Dec78.

[59]See: ltr Col Walter R. Brett, staff weather officer to TRADOC, to TRADOC (DCSORI and DCSCD), "Weather," 20Apr77, included as Sup Doc #8 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun77, itself included as Appendix 2 in Vol I of "History of the 5th Weather Wing," Jan-Jun77; ltr Lt Col Owen Y. Macy, OL-A 5WW, to OL-C 5WW, "Unit Information Report (RCS: 5WW DO(M) 7203)," 6May77, included within Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun77.

[60]"History of the 16th Weather Squadron," 1Jul-30Sep76, p. 7, included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jul-Dec76.

[61]Capt Wilbur G. Hugli, one of the very few experts AWS had in 1978 on the subject of weather support to Special Forces in unconventional warfare, believed Rowe's policy reflected a basic lack of understanding of the capabilities, missions, and doctrine of Army and Air Force Special Forces. For his interesting and provocative assessment of the subject, see ltr Hugli to 7WS (DO), "Weather Support to Unconventional Warfare Forces," 18Jan78, included as Sup Doc #47 to "History of the 7th Weather Squadron," Jan-Jun78, itself included as Appendix 2 in "History of the 2d Weather Wing," Jan-Jun78.

[62]Ltr and 2 atch Col John W. Reames, ch, ops div, 5WW, to HQ AWS (DO), "Concept for Unconventional Warfare/Special Operations Weather Support," 4Apr78, included as Sup Doc #72 in Vol 4 of "History of the 5th Weather Wing," Jan-Jun78.

[63]Vol I, *Narrative*, pp. 325-26, of *History of Air Weather Service*, 1Jul74-31Dec75 (S) info used (U); Fuller, draft, *Keith R. Grimes, Special Operations Weatherman: An Oral Autobiography* (Scott AFB, IL: Office of MAC History, Mar78); "Special Weather Support," pp. 1-24 in Vol III of "History of the 1st Weather Wing," Jul-Dec72; "Special History for the Special Warfare Weather Team/Special Operations Weather Team, 10th Weather Squadron," and 52 related documents, included within Vol III of "History of the 1st Weather Wing," Jul-Dec73; and Fuller, *Air Weather Service, 1937-1977: An Illustrated Chronology* (Scott AFB, IL: Office of MAC History, Jul77), pp. 38-39.

[64]Ltr Owens to 16WS (CC), "Unit Activity Letter (May 1976)," 2May76, included within Sup Doc #9 to "History of the 16th Weather Squadron," Jan-Jun76, itself included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[65]Background paper Col James S. Kennedy, asst DCS Ops, HQ AWS, "Meteorological Support for the US Army - AR 115-10/AFR 105-3," 29Jan76.

[66]Msg 2WW (DOX) to AWS (DOQ), info 1WW (DO), *et al.*, "Tactical Weather Support Concepts," 091600ZSep75.

[67]DoD, JCS Pub 2, *Unified Actions Armed Forces (UNAAF)*, (Wash DC: JCS, Oct74), (FOUO), pp. 108-09.

[68]DCS Ops, HQ AWS, "Semi-Annual Report of Activities," Jul-Dec71, included within Tab 6 in Vol VI, "Supplements," of "History of Air Weather Service," 1Jul71-30Jun72 (S). Info used (U).

[69]Ltr Col A. L. Galli, USAICS (ARSI-CTD-MS), to Dept of the Army (ACSI, *et al.*), "Prerevision Review of FM 31-3/AFM 105-4, Weather Support for Field Army Tactical Operations," 6Sep74.

[70]Ltr Col Mortimer F. Bennet, AF/PRW, to USAICS (ATSI-CTD-MS), "Prerevision of FM 31-3/AFM 105-4, Weather Support for Field Army Tactical Operations (Your Ltr, 6 Sep 1974)," 16Sep74.

[71]Ltr Bennet to MAC (XPPE), "Prerevision of FM 31-3/AFM 105-4, Weather Support for Field Army Tactical Operations," 16Sep74.

[72]See: ltr and atch (Comments on FM 31-3/AFM 105-4") Lt Col James W. Hall, Dir of Rqmts Validation (AWS/DOQ), DCS Ops, HQ AWS, to MAC (XPPE), "Prerevision of FM 31-3/AFM 105-4, Weather Support for Field Army Tactical Operations (Your Ltr, 19Sep74)," 13Nov74; ltr Col William E. Harris, Jr, Dep Dir of Programming and Policy (MAC/XPP), DCS Plans, HQ MAC, to HQ USAF (PRW), "Prerevision of FM 31-3/AFM 105-4, Weather Support for Field Army Tactical Operations (Your Ltr, 16Sep74)," 18Nov74; and ltr Col Bennet, AF/PRW, to USAICS (ATSI-CTD-MS), "Prerevision of FM 31-3/AFM 105-4, Weather Support for Field Army Tactical Operations (ATSI-CTD-MS Ltr, 6 Sep 1974)," 2Dec74--included together as Sup Doc #17 in Vol II, "Supporting Documents," of this study.

[73]Ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW-DO (M) 7203)," 7Mar77, and ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW-DO (M) 7203)," 30Jun77--both included within Sup Doc #10 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun77.

[74]Ltr Lt Col Darrell T. Holland, OL-E, 5WW, to OL-C 5WW, "Unit Information Report - August 1977," 2Sep77, included within Sup Doc #11 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[75]See: Army Field Manual 31-3/Air Force Manual 105-4, *Weather Support for Field Army Tactical Operations*, Dec69, and AWS Sup 1 to AFM 105-4, "Weather: Weather Support for Field Army Tactical Operations," 21Jul75--included together as Sup Doc #18 in Vol II, "Supporting Documents," of this study.

[76]See: AR 115-10/AFR 105-3, "Environmental Services: Meteorological Support for the U.S. Army," 9Jun70, and AWS Sup 1 to AFR 105-3, "Weather: Meteorological Support for the U.S. Army," 8Apr77--included together as Sup Doc #19 in Vol II of this study.

[77]Ltr and atch ("Background Information") Maj Gen William W. Berg, Asst Dep Ch of Staff for Programs and Resources (AF/PR), USAF, to Dir of Intel Spt (DAMI-DS), Dept of the Army, "U.S. Army Requirements for Direct Weather Service," 24Oct72, included as Sup Doc #20 in Vol II, "Supporting Documents," of this study.

[78]Then serving as chief of the Env Svcs Div (MAC/XPPE), Directorate of Programming and Policy, DCS Plans, HQ MAC.

[79]*Rowe Interview: Army Weather Support*, p. 48, included as Sup Doc #4 in Vol II, "Supporting Documents," of this study.

[80]Ltr, Col Wilson J. Boaz, asst DCS Ops, HQ AWS, to AWS (DO and CS), "Trip Report - Pentagon, Washington DC 5-6Apr73," 13Apr73.

[81]Interview by author on 18Jan79 at HQ AWS with Col LeMole, AWS vice commander.

[82]Ltr Col Boaz to AWS (DO and CS), "Trip Report - Pentagon, Washington DC 5-6Apr73," 13Apr73.

[83]Telephone interview by author on 23Jan79 with Col (USAF ret) Bennet.

[84]Interview by author on 18Jan79 at HQ AWS with Col LeMole, AWS vice commander.

[85]Vol I, "Narrative," p. 226, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[86]DoD Directive 4000.19, "Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support," 27Mar72.

[87]See: msg CSAF (LGXO) to ALMAJCOM (DCS Logistics), info DALO-OMD Wash DC, *et al.*, "DoDD 4000.19, 'Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support,' Dated 27 March 72," 172115ZJan73; ltr Col Clarence B. Hand, ch, Log Planning Div (AF/LGXO), Asst for Log Planning, DCS Log, HQ USAF, to MAC (LGX), "USAF Weather Support to USA Units," 26Jan73; and ltr Col Earl A. Thompson, Dir of Log Plans (MAC/LGXP), DCS Log, HQ MAC, to AWS (LGS), "Defense Retail Interservice Support Program," 20Feb73--included together as Sup Doc #21 in Vol II, "Supporting Documents," of this study.

[88]Vol I, "Narrative," p. 247, of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[89]See: ltr and atch (draft revision of AR 115-10/AFR 105-3) Bennet to MAC (XPPE), "Meteorological Support for the Army," 9Oct73; and ltr Col Theodore N. Mace, Dir of Programming and Policy (MAC/XPP), DCS Plans, HQ MAC, to HQ USAF (PRW), "Meteorological Support for the Army (Your Ltr, 9Oct73)," 27Nov73--included, respectively, as Atchs 5 and 6 to Rqmts Validation Directorate (AWS/DOQ), DCS Ops, HQ AWS, "Semiannual Report of Activities," Jul-Dec73, itself included within Tab 3 in Vol IX, "Supplements," of "History of Air Weather Service," 1Jul72-30Jun74 (S). Info used (U).

[90]See: ltr Bennet to MAC (XPPE), "Meteorological Support for the Army (Your Ltr, 27 Nov 1973)," 14Jan74; and ltr Col William E. Harris, Jr, Dep Dir of Programming and Policy (MAC/XPP), DCS Plans, HQ MAC, to HQ USAF (PRW), "Meteorological Support for the Army (Your Ltr, 14Jan74)," 21Feb74--included together as Sup Doc #22 in Vol II, "Supporting Documents," of this study.

[91]Background paper, Col Joseph D. Saccone, asst DCS Ops, HQ AWS, "AR 115-10/AFR 105-3 Meteorological Support for the US Army," n.d. (*circa* Mar75), included as p. 59 of Sup Doc #46 in Vol II, "Supporting Documents," of *History of Air Weather Service*, 1Jul74-31Dec75 (S). Info used (U).

[92]Ltr and atch (draft rewrite of AR 115-10/AFR 105-3), Lt Col Robert E. Julian, Dir Rqmts Validation (AWS/DOQ), DCS Ops, HQ AWS, to 1WW (DO), *et al.*, "Update of AR 115-10/AFR 105-3, Meteorological Support to the US Army," 7May74, included as Sup Doc #23 in Vol II, "Supporting Documents," of this study.

[93]Telephone interview by author on 19Jun78 with Col Cummins, AF/PRW.

[94]Ltr Cummins to AWS (DO), "AFR 105-3/AR 115-10 (AWS/DOQ Ltr, 25 Aug 1975)," 29Aug75, included as Sup Doc #24 in Vol II, "Supporting Documents," of this study.

[95]Telephone interview by author on 19Jun78 with Col Cummins, AF/PRW.

[96]USAICS fact sheet, "Joint Working Group (JWG), US Army Weather Support, ACN 22555I," 17May76, included as Encl #3 to ltr Lt Col James C. Owens, staff weather officer to USAICS, to 16WS (CC), "Unit Activity Letter (May 1976)," 26May76, itself included within Sup Doc #9 to "History of the 16th Weather Squadron," Jan-Jun76, which, in turn, is included as Appendix 5 in Vol 2 of "History of the 5th Weather Wing," Jan-Jun76.

[97]See: ltr Lt Col Seymour Levine, ch, Intel Spt Div (DAMI-TSI), Dept of the Army, to TRADOC (ATCD-SIE), "Proposed Revision of AR 115-10/AFR 105-3, Meteorological Support to the US Army," 13Jul76; and ltr Capt R. C. Tyler, asst Adj Gen (ATCD-SIE), TRADOC, to CACDA, *et al.*, "Proposed Revision of AR 115-10/AFR 105-3, Meteorological Support to the US Army," 2Aug76--included together as Sup Doc #25 in Vol II, "Supporting Documents," of this study.

[98]Much of the pertinent correspondence is included as atchs to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[99]Ltr Macy to OL-C 5WW, "Unit Information Report (RCS: 5WW DO (M) 7203)," 3Aug77, included as Sup Doc #9 to "History of OL-A, C, and E, 5th Weather Wing," Jul-Dec77, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jul-Dec77.

[100]Ltr and atch (proposed Army rewrite of jt reg) Col Cummins, AF/PRW, to MAC (XPP), "Revision of AR 115-10/AFR 105-3, Weather Support to the US Army" 12Oct77, included as Sup Doc #26 in Vol II, "Supporting Documents," of this study.

[101]Ltr and atch (proposed AWS rewrite of jt reg) Col Ramon C. Wilkins, ch of staff, AWS, to MAC (XPP), "AR 115-10/AFR 105-3, Weather Support to the US Army (Yr Ltr, 17 Oct 77)," 15Dec77, included as Sup Doc #27 in Vol II, "Supporting Documents," of this study.

[102]Ltr and atch ("Comments on Issues and Actions Pertaining to Army Weather Support") Rowe to CINCMAC, "AWS/CC Monthly Activity Report," 7Dec77, included as Sup Doc # 28 in Vol II, "Supporting Documents," of this study.

[103]Memo and atch CINCMAC to AWS (CC), info MAC (XP), "AWS/CC Monthly Activity Report," 12Dec77.

[104]Ltr Col John D. Sims, Director, Programming and Policy (MAC/-XPP), DCS Plans, HQ MAC, to HQ USAF (PRW), "AR 115-10/AFR 105-3, Weather Support to the US Army," 17Jan78, included as Sup Doc #29 in Vol II of this study.

[105]Telephone conversations by author on 13Apr78 with: Lt Col John H. Haneklau and Maj John J. Kelly from the Env Svcs Div (MAC/-XPPE), Dir of Programming and Policy, HQ MAC; Lt Col Dell V. McDonald, Dir of Concepts & Special & Tech Svc Plans (MAC/XOZ), DCS Ops Plans, HQ MAC; Maj Mervin G. Davis, Tech Plans Div (AWS/DOQX), Dir of Rqmts, DCS Ops, HQ AWS; and Maj Glenn W. McBride, Readiness Div (AWS/DOQP), Dir of Rqmts, DCS Ops, HQ AWS.

[106]Msg 2WW (DO) to AWS (DO), "AWS Army Support Policy (Yr Ltr, 15 Nov 77)," 281425ZNov77.

[107]Ltr Col John W. Reames, ch, ops div, 5WW, to AWS (DO), "Army Support," 25Nov77, included as Sup Doc #29 in Vol 3 of "History of the 5th Weather Wing," Jul-Dec77.

[108]Ltr Col Sims, (MAC/XPP) to AWS (CS), "Memo of HQ USAF/PRW Discussions with MAC and AWS Staff, 10-11 Nov 77," 23Nov77, and DCS Ops (AWS/DO), HQ AWS, "One Liners for CC," Nov77.

[109]Telephone interview by author on 19Jun78 with Col Cummins.

[110]Ltr and atch ("Position Paper," with 3 atch) Lt Col Donald E. Smith, Director of Rqmts (AWS/DOQ), DCS Ops, HQ AWS, to AWS (DOS, *et al.*), "AWS Army Weather Support Policy," 28Sep77, included as Sup Doc #30 in Vol II of this study.

[111]Memo for record, Rowe, "Army Weather Support," 8Aug77, included as Sup Doc #31 in Vol II of this study.

[112]Ltr and atch Lt Col Smith, AWS/DOQ, to AWS (DOS, *et al.*), "AWS Army Weather Support Policy," 28Sep77.

[113]See: ltr w/o atch (see *ibid.*) Col Norman F. Rauscher, asst DCS Ops, HQ AWS, to 1WW (DO, *et al.*, "AWS Army Support Policy," 3Oct77; and ltr and atch ("Policy") Col Hyko Gayikian, ch of staff, AWS, to 1WW (CC), *et al.*, "AWS Army Support Policy," 15Nov77--included together as Sup Doc #32 in Vol II of this study.

[114]Ltr and 2 atch (position paper and atch, "AWS Army Support Policy," and position paper and atch, "AWS Army Reserve Component--ARC--Policy") Col Rauscher, asst DCS Ops, HQ AWS, to AWS (CS), "Presentation to HQ AWS Council," 5Dec77, included as Sup Doc #33 in Vol II, "Supporting Documents," of this study.

[115]*Rowe Interview: Army Weather Support*, p. 17, included as Sup Doc #4 in Vol II of this study.

[116] Vol I, *Narrative*, pp. 65-66, 71-74, of *History of Air Weather Service*, 1976 (S). Info used (U).

[117] Ltr Lt Col Swayne, AWS/LN, to Mr. Beck, Dept of the Army (DAMI-TST-I), "Army Weather Support," 22Dec77, included as Sup Doc #6 in Vol II, "Supporting Documents," of this history.

[118] Col Rowe's remarks recorded by the author at the HQ AWS staff meeting of 20Oct75.

[119] Msg HQ Dept of the Army (DAMO-RQS) to comdr TRADOC, *et al.*, info comdr FORSCOM, *et al.*, "The Use of Realistic Battlefield Environmental Conditions throughout the Army," 222225ZNov77, included as Sup Doc #2 to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun78.

[120] Memo Col Sims, MAC/XPP, to MAC (XP), "Army Weather Support," 17Jan78.

[121] Ltr Gen William G. Moore, Jr, comdr in ch, MAC, to Gen David C. Jones, ch of staff, USAF, 4Jan78, p. 7.

[122] See coverage in the first chapter herein, and Vol I, *Narrative*, pp. 16-20, of *History of Air Weather Service*, 1976 (S). Info used (U).

[123] *Rowe Interview: Army Weather Support*, pp. 52-53, included as Sup Doc #4 in Vol II of this study.

[124] *Ibid.*, 53.

[125] *Ibid.*, 66-68.

[126] *Ibid.*, 22-23

[127] *Ibid.*, 18, 46.

[128] *Ibid.*, 19, 47-49.

[129] *Ibid.*, 55.

[130] *Ibid.*, 11-12, 36.

[131] *Ibid.*, 35-38.

[132] *Ibid.*, 57-58.

[133] *Ibid.*, 38-40.

[134] *Ibid.*, 19, 26.

[135] *Ibid.*, 27-28, 38, 40-41.

[136] *Ibid.*, 25-26.

[137] *Ibid.*, 28-30, 44-45.

[138] *Ibid.*, 59-60.

[139] *Ibid.*

[140] See text of Rowe's presentation, "Army Weather Support," and accompanying slides, included as Sup Doc #34 in Vol II, "Supporting Documents," of this study.

[141] Ltr Rowe to CINCMAC, "AWS/CC Monthly Activities Report," 4Aug78.

[142] Ltr Rowe to CINCMAC, "AWS/CC Monthly Activities Report," 3Feb78.

[143] Ltr Lt Col Swayne, Army liaison officer to AWS, to TRADOC (ATFE), "Liaison Activities (RCS ATFE-2)," 5Jul78.

[144]Ltr Office of the Adjutant Gen, Dept of the Army, to Sec of the Army, *et al.*, "Special Meteorological Task Force," n.d. (*circa* 1Mar78); and ltr Col Fuller, ch, Imagery Intel Div, Asst Ch of Staff for Intel, Dept of the Army, to Sec of the Army, *et al.*, "Recommendations for Improvement of Army Meteorological Activities," 19May78--included as Sup Docs #13 and 14, respectively, to "History of OL-A, C, and E, 5th Weather Wing," Jan-Jun78, itself included as Appendix 2 in Vol 1 of "History of the 5th Weather Wing," Jan-Jun78.

[145]Ltr Col Wilkins, ch of staff, AWS, to HQ USAF (PRW), "Recommendation for Improvement of Army Meteorological Activities," 22May78, included as Sup Doc #35 in Vol II, "Supporting Documents," of this study. See also point paper Col Saccone, DCS Ops, HQ AWS, "Army Weather Support - AWS Initiatives (Visit of General Robert F. Shoemaker, Acting Commander, United States Army Forces Command)," 8Aug78.

[146]Ltr Rowe to CINCMAC, "End of Tour Report," 17Aug78.

[147]Ltr Lt Gen Thomas M. Ryan, Jr, vice comdr in ch, MAC, to HQ USAF (XO), "Revision of AR 115-10/AFR 105-3, Meteorological Support for US Army," 4Dec78; and ltr Maj Gen Hoyt S. Vandenberg, acting Dep Ch of Staff for Plans and Ops, HQ USAF, to CINCMAC (CV), "Revision of AR 115-10/AFR 105-3, Meteorological Support for US Army," 19Dec78--included together as Sup Doc #36 in Vol II, "Supporting Documents," of this study.

[148]On the grounds that such presence was not needed, Colonel Wilkins, the AWS chief of staff and ex officio AWS Council chairman, denied the author's request to sit in as an observer on the council meeting of 23 March 1979, at which AWS' Army weather support policy was deliberated by the AWS leadership. It was clear to the author that the Kaehn administration did not wish to be encumbered with facts about past machinations on Army weather support.

[149]Ltr and atch (ltr and 2 atch ["AWS Policy on Army Weather Support," and "AWS Current Army Support"] Col Wilkins, "Report of HQ AWS Council Meeting," 17Apr79) Col Wilkins, ch of staff, AWS, to 1WW (CC), *et al.*, "AWS Army Support Policy," 3May79, included as Sup Doc #37 in Vol II, "Supporting Documents," of this study.

[150]CMSgt Horn's remarks recorded by the author at the HQ AWS staff meeting of 10May79.

CHAPTER 10 - CONCLUSION: ASSETS AND ATTITUDES

[1]The remarks of Cols (USAF ret) Leonard V. Gillespie and Walton L. Hogan, Sr, former comdrs of the 7WS and 16WS, respectively, who spent much of their careers in Army weather support, are found in memo for record and 3 atch, Col William E. Cummins, II, asst DCS Ops, HQ AWS, "Army Support Forum," pp. 1-3, 21Apr72.

[2]Telephone interview by author on 25Jan79 with Col (USAF ret) Mortimer F. Bennet, 1WG comdr in 1971; and ltr and atch Col Daniel B. Mitchell, 1WG comdr, to 1WW, "Project CORONA HARVEST End of Tour Report," n.d. (*circa* 7Jan70), included within Tab 104 of Fuller, ed., "End of Tour Reports," 15Apr70.

FOOTNOTE TO PAGE 221

[3]Vol I, *Narrative*, pp. 7-8, of *History of Air Weather Service*, 1976 (S). Info used (U).

ABSTRACT

This study is a critical analysis of the unsatisfactory support provided the United States Army by the United States Air Force's Air Weather Service (AWS) from the 1960s through 1978.

The opening chapter, entitled "Pre Vietnam," briefly reviews the problems AWS endured supporting the Eighth Army during the Korean War. It looks at post-war directives addressing Army weather support doctrine and policy, including Air Force Manual 105-6, *Weather Service for Military Agencies*, of December 1956; AWS Regulation 55-56 of October 1957 addressing Army support; and the 1962 version of Army Regulation 115-10/Air Force Regulation 105-3, predicated on one of over 200 roles-and-mission agreements concluded by the Army and Air Force under the National Security Act of 1947. It also discusses policy guidance from the Air Staff in the late 1950s.

Chapter 2 on Vietnam looks at the effects of weather and weather support on Army operations in combat, in particular to the 1st Cavalry Division (Airmobile) and the 101st Airborne Division during the battles at Hue, Khe Sanh, and the A Shau Valley in the 1968 Tet offensive. Addressed are: weather modification efforts in 1968 (including rainmaking missions by WC-130s and RF-4Cs over the Ho Chi Minh Trail and the A Shau Valley; and attempts at clearing warm fog at Khe Sanh by dropping salt from C-123s); observing, forecasting, and staff weather officer service provided to, and utilized by, General Westmoreland and his staff at USMACV, General Momyer and his staff at Seventh Air Force, by Major General Tolson and his 1st Cavalry Division (Airmobile), and by the 101st Airborne Division; and the problems which arose (many identical to those faced by AWS in the Korean War), including peacetime programming procedures that could not keep pace with wartime requirements, Army commanders unaware of the service available through AWS or how to use it, AWS personnel who had no prior experience or training with the Army, over-sophisticated tactical weather observing equipment that would not work, or could not be kept in commission in the field, and glaring shortcomings in weather communications concepts and support in a combat arena.

Chapter 3 discusses the Army's organization in the 1970s, and the structure AWS webbed together to support it. It investigates the artillery meteorological sections, and how the Army's meteorological function was handled on the Department of the Army staff, at the Atmospheric Sciences Laboratory at Fort Huachuca, TRADOC's (Training and Doctrine Command) Combined Arms Center and Combined Arms Combat Development Activity (CACDA) at Fort Leavenworth, and at USAICS (United States Army Intelligence Center and School) at Fort Huachuca. It looks at the Army's EAD (Echelons Above Division) decision of 1973, its EAC (Echelon Above Corps) concept, and efforts through the years to form an Army Meteorological Service or an Army Weather Service.

Chapter 4 delves into the manpower authorized and assigned AWS by the Air Staff to support the Army; the formal procedures used to determine manning levels, including peacetime SORs (Statement of Requirements) and the roles AWS Staff Weather Officers and the Army's G-2

(Intelligence) officers played in formulating them; and the Air Force's MEFPAK (Manpower and Equipment Force Packaging) system with its MANFOR (Manpower Force Packaging), LOGFOR (Logistics Force Packaging System), and UTC (Unit Type Code) elements. It looks at the composition and assignment of AWS weather teams (Combat Weather Team, Organic Weather Team, etc.) at corps, divisions and brigades; and the decision in 1973, because of unending manpower reductions the Air Staff and MAC were imposing on AWS, to form skeleton "Cadre Weather Teams" when corps and divisions were in garrison that, in theory if not actual practice, could be beefed up to full authorization during tactical situations or war. It also looks at the issues of utilizing AWS weatherwomen with the Army in war, and the perpetual problem AWS faced in getting sufficient volunteers for jump training to fill parachute-qualified manpower slots.

Chapter 5 analyzes the difficulties AWS faced with new meteorological and weather communications equipment in the 1960s and 1970s, including: the AN/MMQ-2 meteorological van; the AN/TMQ-25 tactical ceilometer; the AN/TMQ-22 tactical observing set; the Belt Weather Kit; the AN/TPS-41 and AN/TPS-68 tactical weather radars; tactical weather satellite readout vans for use in Army weather support, including the Mark IV DMSP (Defense Meteorological Satellite Program) van; SIDS (Satellite Imagery Dissemination System) and "mini"-SIDS (Muirhead and Harris Corporation facsimile transmitters and receivers); battlefield or tactical area weather sensors, including EROWS (Expendable Remote Operation Weather Station) PAWOS (Portable Automatic Weather Observing Station), TAWS (Tactical Area Weather Sensor), RAWS (Remote Automatic Weather Station), BATSS (Battlefield Targeting Support System), and PRESSURS (Pre-Strike Surveillance/Recon System); the MSQ-10 mobile weather communications van; the Tactical Weather System and its Tactical Weather Analysis Center (TWAC); and AWDS (Automated Weather Distribution System). Discussed also is the transfer of AWS' weather equipment maintenance mission and most associated manpower (775 manpower authorizations) to AFCS (Air Force Communications Service) in 1977, and how well AFCS' maintenance service might stand up in war or with the passage of time.

Chapter 6 looks at the critical question of life-sustaining TOE (Table of Organization and Equipment) and MTOE (Modified Table of Organization and Equipment) support to AWS' weather personnel by the Army units they served, and whether Army "proponency" for the weather TOEs/MTOEs should be the responsibility of its Signal or Intelligence functions. Investigated was an Army concept to attach AWS' division weather teams to the division's Intelligence Company, tested in TARS (Tactical Reconnaissance and Surveillance)-75 at Fort Hood in 1975.

Chapter 7 reviews the critical question of the mid-1970s of whether AWS support at the division level should be direct or indirect (remote), in view of the Army's efforts to reduce the size of its division command posts (the Division Tactical Operations Center--DTOC) and mute their "electronic signatures." Looked at is the Army's MASSTER (Modern Army Selected Systems Tactical Evaluation and Review) Test FM-286 in 1975 at Fort Hood, and indecision among Army general officers, surfaced at a meeting of the Army's Intelligence Advisory Group at Fort Huachuca in 1975, of whether or not AWS support at division should be direct or indirect. Insofar as their bearing on that issue was concerned, reviewed also is the Army's IOSS (Intelligence Organization and Stationing Study), and the test of that concept at Fort Hood in 1975--the TCATA (TRADOC Combined Arms Test Activity) CEWI (Combat Electronic Warfare Intelligence) Test FM-362.

Chapters 8 and 9 critically investigate the Army's requirements for weather support, on which AWS placed so much emphasis, and the all-encompassing topic of weather support doctrine and policy. Submitted to the microscope are the formal SOR (Statement of Requirement) process; the Army's Met-70, Met-75, and TESS (Tactical Environmental Support System) studies, which concluded that AWS support was unsatisfactory, and its MAP/SAMSR (Master Plan for the Satisfaction of Army Meteorological Support Requirements) plan for correcting the inadequacies and satisfying its weather support requirements; AWS' reaction to TESS and MAP/SAMSR; AWS support to Army National Guard and Army Reserve units, and to NATO army forces; the Forward Area Limited Observing Program (FALOP); Air Staff, AWS, and Army policy as expressed by key officials and set forth in individual service regulations and the principal joint directives (Army Regulation 115-10/Air Force Regulation 105-3, and Army Field Manual 31-3/Air Force Manual 105-4); and, in response to increasing evidence that AWS support to the Army was unsatisfactory, the shocking and dramatic proposal by the AWS commander, Brigadier General Berry W. Rowe, in 1977, to chop off all direct AWS support below corps level.

Chapter 10 concludes that attitudes and assets were the reasons why problems in Army weather support persisted unresolved year after year, and why AWS support to the Army in Vietnam and the ensuing period through 1978 was inadequate and unsatisfactory. It suggests that, while the problem of too few assets (men, materiel, and money) would persist under peacetime Air Force budgets so long as AWS was considered "tail" rather than "teeth," AWS could overcome the attitude problem if it stopped levying an unjust tax in promotion and career potential on those of its people evidencing signs of making Army weather support their life's work.

G L O S S A R Y

AAC	Alaskan Air Command
AAF	Army Airfield
AB	Air Base
ADCOM	Aerospace Defense Command
ADWS	Automated Digital Weather Switch
AFB	Air Force Base
AFCRL	Air Force Cambridge Research Laboratories
AFCS	Air Force Communications Service
AFGWC	Air Force Global Weather Central
AFLANT	See USAFLANT
AFLC	Air Force Logistics Command
AF/PR	Deputy Chief of Staff, Programs and Resources, HQ USAF
AF/PRW	Office of the Assistant for Weather, Deputy Chief of Staff, Programs and Resources, HQ USAF
AFSC	Air Force Specialty Code Air Force Systems Command
AF/XO	Deputy Chief os Staff, Plans and Operations, HQ USAF
AI	Army Installation
AMC	Army Materiel Command
AMS	Automated Meteorological System
APO	Army Post Office
APT	Automatic Picture Transmission
ARADCOM	Army Air Defense Command
ARC	Army Reserve Components
ARRS	Aerospace Rescue and Recovery Service
ARTADS	Army Tactical Data System
AS	Air Station
ASL	Atmospheric Sciences Laboratory
AWDS	Automated Weather Distribution System
AWN	Automated Weather (communications) Network
AWS	Air Weather Service
BATSS	Battlefield Targeting Support System
CACDA	Combined Arms Combat Development Activity
CBR	Chemical-Biological-Radiological
CDC	Combat Developments Command
CENTAG	Central European Army Group
CEWI	Combat Electronic Warfare Intelligence
CINCAL	Commander In Chief, Alaskan Command
CINCCONAD	Commander In Chief, Continental Air Defense Command
CINCPAC	Commander in Chief, Pacific Command
CINCSAC	Commander In Chief, Strategic Air Command
CG	Commanding General
CONARC	Continental Army Command
CONUS	Continental United States
CWO	Chief Warrant Officer

CWT	Combat Weather Team
CZ	Canal Zone
DA	Department of the Army
DA/ACSC-E	Assistant Chief of Staff, Communications and Electronics, Department of the Army
DA/ACSFOR	Assistant Chief of Staff, Forces Development, Department of the Army
DA/ACSI	Assistant Chief of Staff, Intelligence, Department of the Army
DAF	Department of the Air Force
DARCOM	United States Army Materiel Development and Readiness Command
DC	District of Columbia
DDR&E	Defense Development Research and Engineering
DESC	Defense Electronics Supply Center
DMSP	Defense Meteorological Satellite Program
DMZ	De-Militarized Zone
DoD	Department of Defense
DTOC	Division Tactical Operations Center
EAC	Echelon Above Corps
EAD	Echelons Above Division
EROWS	Expendable Remote Operating Weather Station
ESD	Electronic Systems Division, AFSC
ETAC	See USAF ETAC
EUCOM	See USEUCOM
EWI	Electronic Warfare and Intelligence
FAA	Federal Aviation Administration
FAC	Forward Air Controller
FALOP	Forward Area Limited (weather) Observation Program
FORSCOM	Forces Command
FM	Frequency Modulation
GOR	General Operational Requirement
HF	High Frequency
HQ	Headquarters
IAG	Intelligence Advisory Group
IDA	Institute for Defense Analysis
IMA	Individual Mobilization Augmentee
IOSS	Intelligence Organization and Stationing Study
ITOS	Improved TIROS Operational Satellite
JCS	Joint Chiefs of Staff
JTIDS	Joint Tactical Information Display System
LOGFOR	Logistics Force Packaging System
LST	Landing Ship, Tank
LZ	Landing Zone

MAC	Military Airlift Command
MANFOR	Manpower Force Packaging System
MAP/SAMSR	Master Plan for the Satisfaction of Army Meteorological Support Requirements
MASSTER	Modern Army Selected Systems Tactical Evaluation and Review
MATS	Military Air Transport Service
MEFPAK	Manpower and Equipment Force Packaging
MI	Military Intelligence
MOS	Military Occupational Specialty
MSI	Mission Success Indicator
MTO&E	Modified Table of Organization and Equipment
NAC	Naval Avionics Center
NAFI	Naval Avionics Facility Indianapolis
NATO	North Atlantic Treaty Organization
NCO	Non Commissioned Officer
NOAA	National Oceanic and Atmospheric Administration
NOE	Nap Of the Earth
NORAD	North American Air Defense Command
NVN	North Vietnam
OAR	Office of Aerospace Research
OER	Officer Effectiveness Report
OL	Operating Location
O&M	Operation and Maintenance
OWT	Organic Weather Team
PACAF	Pacific Air Forces
PAWOS	Portable Automatic Weather Observing Station
PEC	Program Element Code
PEP	Product (weather forecast) Evaluation Program
Pibal	Pilot weather balloon
PIREP	Pilot (weather) Report
PME	Professional Military Education
PRESSURS	Pre-Strike Surveillance/Recon System
QOR	Qualitative Operational Requirement
QMR	Qualitative Materiel Requirement
RAD	Requirements Action Directive
RAWS	Remote Automated Weather Station
RDT&E	Research, Development, Test and Evaluation
REDCOM	Readiness Command
ROC	Required Operational Capability
ROK	Republic of Korea
ROTC	Reserve Officers' Training Corps
RPV	Remotely Piloted Vehicle
R&R	Rest and Recouperation
RVN	Republic of Vietnam
SAC	Strategic Air Command
SACEUR	Supreme Allied Commander Europe
SALT	Strategic Arms Limitation Talks
SAMSO	Space and Missile Systems Organization

SEAOR	Southeast Asia Operational Requirement
SEA WECEN	Southeast Asia Joint Operations Weather Center
SIDS	Satellite Imagery Dissemination System
SMAMA	Sacramento Air Materiel Area
SOG	Studies and Observation Group
SOP	Standard Operating Procedure
SOR	Statement of Requirements
SOUTHCOM	Southern Command
TAC	Tactical Air Command
TARS-75	Tactical Reconnaissance and Surveillance (test), 1975
TAWS	Tactical Area Weather Sensor
TCATA	TRADOC Combined Arms Test Activity
TESS	Tactical Environmental Support System (study)
TIROS	Television and Infrared (weather) Observation Satellite
TO	Technical Order
TOA	Total Obligational Authority
TOC	Tactical Operations Center
TOE	Table of Organization and Equipment
TOS	Tactical Operations System
TRADOC	Training and Doctrine Command
TRESS	Tactical Remote Environmental Sensor System
TWAC	Tactical Weather Analysis Center
UHF	Ultra High Frequency
UK	United Kingdom
UN	United Nations
USACDC	United States Army Combat Developments Command
USACDC-INCSG	USACDC-Intelligence and Control Systems Group
USACDC/INTA	USACDC/Intelligence Agency, Intelligence and Control Systems Group
USACSG	United States Army CINCPAC Support Group
USAF	United States Air Force
USAFE	United States Air Forces in Europe
USAF ETAC	United States Air Force Environmental Technical Applications Center
USAFLANT	United States Air Force Forces Atlantic
USAFSO	United States Air Forces Southern Command
USAICS	United States Army Intelligence Center and School
USARAL	United States Army Alaska
USARCARIB	United States Army Caribbean
USAREUR	United States Army Europe
USARPAC	United States Army Pacific
USARSO	United States Army Forces Southern Command
USARV	United States Army Vietnam
USCINCEUR	United States Commander In Chief, Europe
USCINCSO	Commander in Chief, United States Southern Command
USEUCOM	United States European Command
USFJ	United States Forces Japan
USFK	United States Forces Korea
USMACV	United States Military Assistance Command, Vietnam
USMC	United States Marine Corps
UTC	Unit Type Code

WETM	Weather Team
WG	Weather Group
WII	Weather Impact Indicator
WRS	Weather Reconnaissance Squadron
WS	Weather Squadron
WW	Weather Wing
WWMCCS	World Wide Military Command and Control System

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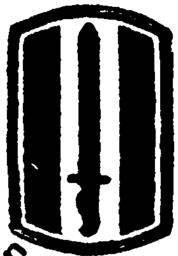
10th Special Forces Group (Airborne)

11th Air Defense Artillery Group

193d Infantry Brigade



4th Infantry Division (Mechanized)
"The Ivy Division"

197th Infantry Brigade

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"Merrill's Marauders"

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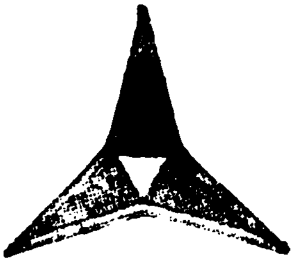
"Victory Division"

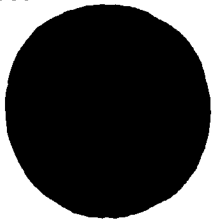
III Corps



XVIII Airborne Corps

Fifth United States Army

7th Infantry Division
"Bayonet"



194th Armored Brigade

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Sixth United States Army