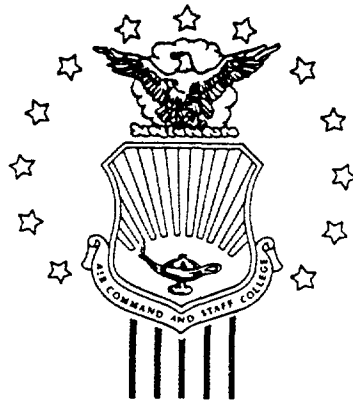


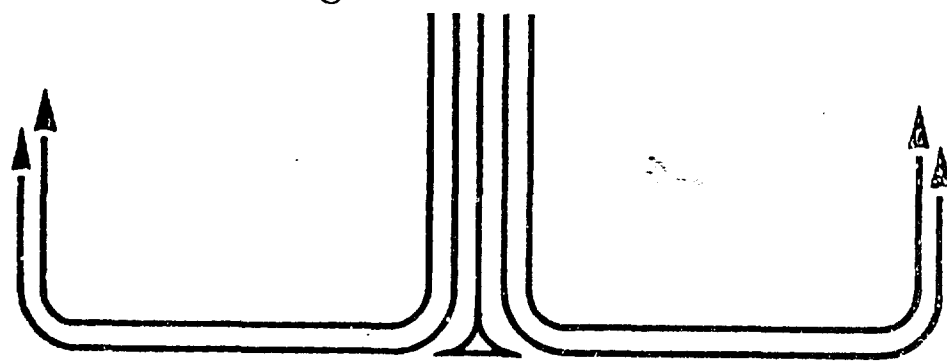
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STUDENT REPORT
 JOINT CHEMICAL DEFENSE
 FOR THE REAR BATTLE: MAIN OPERATING
 BASES IN NATO'S CENTRAL REGION
 MAJOR MICHAEL D. SALMI 88-2305
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MAIN OPERATING BASES IN NATO'S CENTRAL REGION



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requirements for graduation.

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) In 1984, the Chiefs of Staff of the US Army and the US Air Force signed a Memorandum of Understanding (MOU) outlining a concept for the joint air defense of overseas air bases. With little previous experience in joint rear area operations, problems were bound to occur, especially in the area of chemical warfare defense (CWD). The Army bases its CWD doctrine on the concept of maneuver while the Air Force bases its doctrine on being tied to air bases with little or no capability to avoid chemical attacks. Each Service developed its doctrine to support its operational concept. This study compared and contrasted the CWD doctrine of the Army and the Air Force. It found a great deal of commonality exists; however, there are also several problems which could lead to death, injury, and degradation of sortie generation capability.

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PREFACE

In 1984, the Chiefs of Staff of the US Army and the US Air Force signed a Memorandum of Understanding (MOU) outlining a concept for the joint air and ground defense of overseas air bases. The two Services had never attempted such an extensive, long-term, joint undertaking before, and problems were bound to appear -- especially in the area of chemical warfare defense (CWD) operations. Prior to 1983, the Army based its approach to CWD on the concept of maneuver. Its front-line combat units would avoid battlefield contamination whenever possible, and if they became contaminated, they would maneuver out of the contaminated area as soon as practical, decontaminate, and return to combat. In the late 1970s, when the Air Force first began to take CWD seriously, it realized it would have to operate from fixed sites (air bases) without the luxury of avoiding or maneuvering out of contamination. This led them to develop a doctrine of remaining in the contaminated area for as long as necessary to sustain sortie generation. With the Army now committed to defending fixed sites, the Services need to assess the compatibility of their CWD doctrines and the ability of those doctrines to support air power (i.e., support air base sortie generation). This project is intended for use by CWD doctrine developers in both the Army and the Air Force. The lack of compatible, joint doctrine can severely degrade sortie generation, as this study will show.

The HQ USAF Air Base Operability Division (HQ USAF/XOORB) agreed to sponsor this project as a part of its ongoing efforts to improve the ability of air bases to survive all types of attacks and continue mission-critical operations in degraded post-attack environments. This project would not have been possible without the extensive support of Major Jerry Fager of HQ USAF/XOORB and Major Fred Evans of the US Army Chemical School (TRADOC) doctrine office. A special thanks goes to Major Michael Lenhart, USA, for his outstanding support of this joint project.

ABOUT THE AUTHOR

Major Michael D. Salmi is a 1974 graduate of Bradley University in Peoria, IL. He received his commission through the Air Force ROTC program as a Distinguished Graduate. He entered active duty in late 1974, and his first operational assignment was at F.E. Warren AFB, WY where he served as a Minuteman Missile Launch Officer on line crews and in the Standardization/Evaluation Division. After leaving the crew force, he went to Ellsworth AFB, SD where he served in the 4th Airborne Command Control Squadron as an Airborne Missile Launch Staff Officer and unit scheduler. In 1980, he was a Distinguished Graduate of the Air Force Disaster Preparedness School and served as the Disaster Preparedness Officer for the 601st Tactical Control Wing, Sembach AB, GE. While at Sembach, he was selected by HQ United States Air Forces in Europe to augment the NATO Allied Air Force Central Europe (AAFCE) Tactical Evaluation Team on the Survive-to-Operate branch. In this position, he was responsible for evaluating the nuclear, biological, and chemical (NBC) defense effectiveness of AAFCE air bases in the United Kingdom, Belgium, the Netherlands, and Germany. In 1983, he moved to the Disaster Preparedness Directorate at HQ USAFE where he was involved in numerous chemical warfare defense programs and augmented the NBC battle staff at HQ 4th Allied Tactical Air Force (NATO). In 1984, he transferred to the Air Force Disaster Preparedness Resource Center (HQ USAF) where he served as the Assistant Chief and, later, Chief. From 1983 to 1987 he represented the Air Force at numerous NATO NBC defense conferences. During 1983 and 1984, he was a member of the team planning the chemical portions of Exercise SALTY DEMO. He served as the deputy chief of the chemical play control team during the execution portion of the exercise. In 1987, he was assigned to the Air Command and Staff College as a student.

His decorations include the Meritorious Service Medal and the Air Force Commendation Medal. He holds a Bachelor of Science degree in Psychology from Bradley University and a Master of Science degree in Public Administration from Troy State University.

Major Salmi is married to the former Lynn [REDACTED] of Atlanta, GA. They have three sons.

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EXECUTIVE SUMMARY



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REPORT NUMBER 88-2305

AUTHOR(S) MAJOR MICHAEL D. SALMI, USAF

TITLE JOINT CHEMICAL DEFENSE FOR THE REAR BATTLE: MAIN OPERATING BASES IN NATO'S CENTRAL REGION

I. Purpose: To determine if current Army and Air Force doctrine and operational concepts for chemical warfare defense (CWD) allow for sustained operations in a chemical environment at USAF NATO Central Region main operating bases.

II. Problem: The 1984 Memorandum of Understanding between the Chiefs of Staff of the Army and the Air Force called for joint defense of USAF overseas air bases. Since Army and Air Force doctrine for CWD center on different operational assumptions, can they work together successfully to sustain sortie generation in the chemical environment?

III. Data: Army CWD doctrine centers on the concept of maneuver: maneuver to avoid contamination whenever possible, and once contaminated, maneuver out of the contamination as quickly as practical. Air Force doctrine calls for sustaining operations at the air base as long as practical since sortie generation operations

are tied to an immovable runway and air base infrastructure. Each Service developed its doctrine to support its own operational concept.

IV. Conclusions: Even though the Army and the Air Force developed CWD doctrine using different assumptions, there is a high degree of commonality. However, certain critical disconnects, especially in the areas of attack alarm signals and collective protection, could disrupt or curtail cortis generation at an air base trying to operate under chemical contamination. However, these problems are not insurmountable.

V. Recommendations: The Army and the Air Force need to coordinate their CWD doctrine for fixed site operations to assure they complement, rather than contradict, each other. Specifically, the Air Force needs to develop a doctrine publications set to support air base operations the way Army Field Manuals 3-3, 3-4, 3-5, and 3-100 support AirLand Battle. If the Army trained its soldiers on standard NATO attack alarm signals, it would be better prepared to operate on and around air bases. The Army also needs to review new methods for extending its ability to sustain operations in the chemical environment and not simply rely on movement (maneuver) to uncontaminated areas.

Chapter One

A CASE FOR THE ASSESSMENT OF DOCTRINE FOR JOINT CHEMICAL WARFARE DEFENSE OPERATIONS AT OVERSEAS AIR BASES

At the very heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory. Doctrine is of the mind, a network of faith and knowledge reinforced by experience which lays the pattern for the utilization of men, equipment, and tactics. It is the building material for strategy. It is fundamental to sound judgement.

GENERAL CURTIS E. LEMAY, 1968 (9:1)

According to Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine for the United States Air Force, "Doctrine drives how the Air Force organizes, trains, equips, and sustains its forces" (9:v). But, in a theater war, the Air Force does not operate in isolation; it must operate in one or more environments (the air, space, adverse weather, electronic warfare, etc.) (9:1-2 - 1-3). Today, in large parts of those operational theaters, that environment is also one of potential *chemical warfare* (13:85). It is a "joint" environment, as well. In today's complex, combined arms battlefield, Air Force planners also need to address joint operational doctrine for the joint chemical battlefield, especially with the Army in support of AirLand battle.

In 1984, the Chiefs of Staff of the US Army and the US Air Force signed a Memorandum of Understanding (MOU) defining the responsibilities of each Service for overseas air base air defense (27:--). While this MOU solved many problems concerning base defense, it also raised new ones concerning joint operations. For example, Army and Air Force units in Europe will now conduct joint operations on and around air bases (6:24; 26:1) in a known chemical warfare high threat area (HTA) (13:85). They will need to cooperate in chemical warfare defense (CWD) operations to survive chemical attacks and sustain aerospace operations in the ensuing chemical environment. These operations could consist of soldiers and airmen fighting shoulder to shoulder to defend the air base or

the Air Force directly supporting soldiers operating on air bases or temporarily housed at Air Force-controlled Aerial Ports of Debarkation (APODs) (for example, Ramstein and Rhein-Main Air Bases, GE).

Therefore, this paper will review current Army and Air Force doctrine for joint CWD operations on and around US overseas air bases, analyze how well the doctrine supports aerospace operations, and recommend improvements where needed. However, it will not attempt to judge which Service's doctrine is "better"; it will simply point out CWD doctrine they hold in common and any CWD doctrinal "disconnects" hampering aerospace operations on and around the air base. Disconnects could occur because each Service bases its CWD doctrine on different operational assumptions. Until just recently, Army CWD doctrine focused on front-line maneuver units (5:38-40) while Air Force doctrine focused primarily on fixed site operations (air bases) (10:2-1). This led to different approaches in CWD doctrine development.

In early versions of AirLand Battle doctrine, the Army placed most of its emphasis on maneuver (combat) units. Accordingly, it developed CWD doctrine on the concept of maneuver and gave less emphasis to "fixed" combat support and combat service support units (5:38). If attacked by chemical weapons, units maneuver out of the contamination at the first opportunity. If they need to pass through a contaminated area, they first attempt to bypass it (21:iii-iv). Recognizing the degradation imposed by operating in the cumbersome CWD protective ensembles (21:iii), the Army encourages its commanders to "avoid contamination and, once contaminated, to clean up quickly and get relief from full MOPP" (4:13), preferably by moving to an uncontaminated area (21:iii-v).

The Air Force, on the other hand, must operate from runways on air bases. Warsaw Pact air forces know they will have a difficult time clearing Central Region air space of NATO aircraft by relying on air-to-air operations alone, so they "think that the key to defeating our Air Force is to take the fight to our air bases" (2:34). Assistant Secretary of the Air Force for Readiness Support, Tidal W. McCoy, feels air bases now become lucrative targets for frequent combined conventional and chemical attacks (3:54-55). However, as former Secretary of Defense Weinberger noted, "We are still not at the point where we can conduct sustained combat operations in a chemical environment" (32:290). In response, therefore, the Air Force CWD effort emphasizes manning, organizing, equipping, and training for *sustained* operations in the chemical environment (10:1-1 - 1-2; 13:Ch 12; 15:9) while, until just recently, the Army emphasized *short term* operations to maneuver around or out of contamination.

However, with the publication of Field Manual (FM) 90-14, Rear Battle, in June 1985, the Army took a major step in recognizing and emphasizing the importance of the "rear" in its AirLand Battle doctrine.

The AirLand Battle will be fought deep, close-in, and in the rear. The enemy will attack on the entire depth and width of the battlefield to obtain victory. These attacks will introduce threat forces with tremendous destructive capabilities in a rear battlefield composed primarily of combat support and combat service support units (25:1).

The rear battle area includes such "fixed sites" as command, control and communications centers, depots, and air bases (25:Ch 1). Since both Services now have an interest in sustaining rear area fixed site operations in the chemical environment, they now also have an opportunity to reconcile and refine their CWD doctrine for joint, fixed site operations.

While the Army and Air Force will conduct joint CWD operations in many parts of the world, this analysis will limit its scope to USAF-controlled NATO Central Region air bases. These bases are simple examples of implementation of the joint service MOU on air base defense. Army Air Defense Artillery (ADA) units under the direct operational control of the base commander (an Air Force officer) already protect several regional air bases (6:24-25). On the ground, Air Force, Army and host nation Military Police (MP) and security units cooperate in the rear area ground defense effort with certain elements (depending on their location in reference to the base perimeter) falling under the base commander's control (26:8; 30:4-9). In addition to the Army supporting the Air Force, the Air Force will host large numbers of soldiers on its bases and (at least temporarily) at Central Region APODs. While this analysis is limited in scope, planners can take the lessons learned and apply them to joint, fixed site CWD operations in other theaters.

Since the purpose of this paper is to determine how well current CWD doctrine supports aerospace operations at the air base, it will examine each of the following main categories of interest to the Air Force: individual protective equipment (IPE), collective protection (CP), detection and warning (D&W) devices, contamination control (CC), operational and training doctrine, and command and control (10:2-1 - 2-2). Chapter 2 will deal with each of the six categories in detail using the following basic format:

- Step 1 -- Describe Army doctrine.
- Step 2 -- Describe Air Force doctrine.

- Step 3 -- Describe any joint doctrine for the area.

- Step 4 -- Identify common components of the Army's doctrine and the Air Force's doctrine.

- Step 5 -- Identify conflicting doctrine and doctrinal gaps within the category. Subjectively identify the degree of the effect as CRITICAL (seriously degrades or jeopardizes sortie generation and launch or could lead to severe injury or death), MODERATE (degrades or significantly shortens the sustainability of aerospace operations in the chemical environment), or LOW (little or no effect on sustained aerospace operations, little chance of injury, or, if corrected, could streamline operations).

Chapter 3 will assess the overall operational suitability of existing doctrine for joint, fixed site CWD operations. The Appendix will list specific problems using the following format:

- Problem description.

- Degree of the effect (CRITICAL, MODERATE, or LOW with rationale).

- Recommended solution or a recommendation for further research.

- Recommended office of primary responsibility (OPR) for approving or implementing the solution.

When this project is completed, planners will have an analysis of Army and Air Force CWD doctrine, their common components and problem areas, and recommendations for improvement. They can use the analysis in developing new joint service CWD operational doctrine and in developing joint operational requirements for common CWD equipment to support the doctrine.

Chapter Two

CHEMICAL WARFARE DEFENSE DOCTRINE: REVIEW, CONTRAST, AND COMPARISON

The Principle of Interoperability. This effectiveness is achieved in part through interoperability, which includes collective effort to develop joint doctrine and joint tactics, techniques, and procedures . . . fully compatible with and complementary to systems of all Services.

JCS PUBLICATION 2, DECEMBER 1986 (30:1-3)

This chapter will look at each of the six major categories of CWD doctrine in detail using the format outlined in Chapter One.

INDIVIDUAL PROTECTIVE EQUIPMENT

Individual protective equipment (IPE) forms the first line of chemical defense for soldiers and airmen and consists of items worn to protect the eyes, respiratory tract, and skin from the effects of toxic chemical warfare agents (in both liquid and vapor forms). In both Services, Standard IPE includes a protective mask for the eyes and respiratory tract, a two-piece (jacket and pants) permeable overgarment (commonly called the Battle Dress Overgarment or BDO) to protect the body, and rubber gloves, overboots, and hood to protect the hands, feet, and head/neck areas, respectively. Accessories include the M258A1 Personal Decontamination Kit and chemical detector paper/tape (13:33; 22:Ch 1).

Army Doctrine

Army operational doctrine for IPE uses the concept of Mission-Oriented Protective Postures (MOPP), a system for matching the amount of IPE worn with the threat, the mission, and the degree of risk the commander is willing to assume. It standardizes graduated levels of protection ranging from MOPP 0 (zero) to MOPP 4 to give the commander maximum flexibility (see Figure 2-1) (22:Ch 2). The Army developed MOPP in response to the enormous degradation in combat efficiency (mainly due to heat build up and fatigue (21:iii)) of soldiers forced to wear

all of their IPE for extended periods (21:v; 24:3-3,4-1). In addition, the Army recognized certain situations might require only the use of a protective mask (i.e., non-persistent agents presenting a hazard via the eyes or respiratory tract are the only agents present or expected). For these cases, they have a

MOPP LEVEL	BDO IS	OVERBOOTS ARE	MASK/HOOD IS	GLOVES ARE	OTHER ITEMS
0	Readily Available				
1	Worn	At Hand			
2	Worn		At Hand		
3	Worn			At Hand	
4	Worn				At Hand

Figure 2-1. Army MOPP Levels (22:Ch 2)

"mask only" option (not associated with any specific MOPP) (22:2-2). To provide maximum flexibility on the chemical battlefield, the Army granted its junior commanders the authority to order the appropriate MOPP for their units.

The primary responsibility of higher level commanders is to provide junior level commanders with the threat information they need to set the most appropriate MOPP level for their mission. . . . Commanders must not impose unnecessarily high MOPP levels over large areas merely as a precautionary measure (24:3-4 - 3-6).

Air Force Doctrine

The Air Force published AFR 355-8, Mission-Oriented Protective Postures, on 1 May 1987 adopting most of the Army's MOPP system with two notable exceptions: the Air Force does not normally use the "mask only" option and minimizes the use of MOPP 3 (14:--). Both exceptions are due to the different chemical threats expected for maneuver units and units operating at fixed sites. As noted in Chapter One, the Soviets consider air bases lucrative targets for combined conventional and chemical attacks, and since they know the exact location of the air bases, those sites can expect repeated attacks with little or no warning (2:33-34). Therefore, the Air Force cannot easily use the "mask only" option; it must keep its people in overgarments to allow them to survive the follow-on attacks (14:1-3). Following a chemical attack, the Air Force

even restricts the use of MOPP 3 to "people who cannot perform essential tasks while wearing gloves" (14:2) since it leaves the bare skin of the hands exposed to the chemical contact hazard or hazards from blister (mustard) agent vapors (14:2).

Joint Doctrine

No current joint doctrine for IPE exists.

Common Items

Both Services use MOPP systems, and both use MOPPs 0 through 4 in roughly the same manner.

Conflicting Doctrine and Doctrine Gaps

The differences in Army and Air Force MOPP doctrine (how they use "mask only" and MOPP 3) should not pose a problem for Army units operating in conjunction with the Air Force *if they are well outside of the base perimeter where they are not exposed to direct, follow-on chemical attacks.* However, different circumstances apply to Army units operating on air bases. As noted above, people on bar cannot easily use the "mask only" option. This creates a CRITICAL deficiency since it could result in death or serious injury to soldiers on air bases if their commanders follow Army doctrine and attempt to use "mask only" without carefully coordinating with the base commander (see also the section titled "Command and Control Doctrine").

COLLECTIVE PROTECTION

The Air Force War and Mobilization Plan, Volume 1 (WMP 1), defines collective protection (CP) as

Facilities or systems equipped with air filtration devices and air locks to provide personnel with an uncontaminated area for performing critical work, changing contaminated protective clothing, and obtaining rest and relief at contaminated air bases in order to sustain combat operations (18:J-3).

The Army uses similar terminology in its definition of CP in FM 3-4, NBC Protection (24:3-10, Glossary 3). No matter which definition is used, both Services see CP providing combat sustainability beyond the endurance of people to operate in IPE (about 16 hours) (7:33) and in specialized instances when a particular task simply cannot be done in IPE (17:Atch 5; 22:6-1 - 6-3).

Army Doctrine

The Army doctrine for CP applies mainly to maneuver units. FM 3-4, Chapter 7, "Collective-Protection Planning for Commanders", states

Avoiding or displacing from contaminated terrain is desirable. Neither is it always possible. . . . Every unit is equipped, trained, and conditioned to fight under contaminated conditions when the mission requires. However, . . . at some point, relief from wearing MOPP gear is necessary. The best relief method is rotating contaminated soldiers to a confirmed clean area. . . . However, the tactical situation may preclude [this]. These situations require collective protection (22:7-1).

This emphasis on maneuver units is also seen in the descriptions of the five categories of Army CP systems. The first category, "ventilated facepiece", provides filtered air from a central source to crew members in combat vehicles. The second category better meets the Air Force definition of CP and consists of "overpressure" systems allowing a "reduction of MOPP level." The third and fourth categories are "hybrid" systems combining the ventilated facepiece and overpressure systems in a single vehicle with only one system operating at a time. The fifth category is a "total" system (in reality, a hybrid with both systems operating) (22:Table 6-2). Of these five categories, only one (overpressure) is intended for fixed site operations or extended periods in the field under contamination; the other four categories apply to combat vehicles and vans (22:Ch 6). Even with its overpressure systems, the Army designs them as "field-expedient . . . lightweight and mobile . . . [to allow] unit commanders to convert existing structures into protected command, control, and operations centers" (22:6-4). They make no mention of troop rest and relief indicating they do not plan to remain in the contaminated area long enough for rest and relief to become combat limiting factors.

Air Force Doctrine

Because it operates on fixed sites and faces repeated chemical attacks, the Air Force places greater emphasis on CP. While AFM 1-7, Chemical Warfare Doctrine, devotes only a few lines to CP (10:1-2,2-1), AFRs 355-1, Disaster Preparedness Planning and Operations, and 360-1, Air Base Operability Planning and Operations, emphasize the use of CP to sustain combat operations in the chemical environment. Table 6-1 of AFR 360-1 lists in priority order all of the command and control, maintenance, and rest/relief facilities on an air base requiring CP. It also requires hardening them to varying

degrees to withstand the effects of conventional munitions (15:14-15). AFR 355-1 incorporates the use of CP into the wartime air base daily routine by directing base personnel to "go to collective protection systems when their duty or work shift is complete, or when rest or recuperation is needed" (13:71). The regulation also directs providing CP shelter space "to accommodate the peak onbase [sic] population . . . [on the basis of] one space per two persons for [high threat area] HTA rest and recuperation" (13:72-73). This allows the Air Force to sustain 24-hour operations by using a "hot bunk" concept; each bed space in CP supports two people each day in 12-hour shifts. Current Air Force doctrine for CP is in bits and pieces in various publications (13:Ch 12; 15:--; 18:Annex J; 33:--); however, the Air Force Disaster Preparedness Resource Center (an Air Staff agency) will consolidate it in an omnibus shelter regulation (AFR 355-3) in 1988 (38:--).

Joint Doctrine

No current joint doctrine for CP exists.

Common Items

Both Services see CP as the key to sustaining combat in the chemical environment.

Conflicting Doctrine and Doctrine Gaps

Two areas could pose problems for joint operations on and around the air base.

- While the Army appears to consider CP useful for extending its sustainability by *hours* (it can always relocate to uncontaminated areas), the Air Force currently aims for *seven days of continuous operations* (17:Atch 5). This poses a major problem for Army units assigned to operate on or protect an air base. Persistent chemicals generate (for days) a toxic vapor cloud flowing downwind from the air base (21:App N; 24:Table 1; 28:Ch 1). Repeated attacks extend the duration of the hazard (21:Ch 2, App N). Therefore, the Army has a doctrinal gap concerning sustained operations using CP. For example, since Air Defense Artillery (ADA) must protect the air base from all avenues of approach, some of their units must, by necessity, operate in contaminated areas. This forces soldiers to operate in MOPP 3 or 4 for days. They may not have the resources to support "rotation" operations to a "clean area". In addition, their doctrine does not call for routine use of their CP for troop rest and relief. Extended operations in MOPP gear reduce operational effectiveness (14:Atch 2) and impose a significant physiological burden on troops (14:1). After as little as a single day, the Army could lose its

ability to support air base operations from positions on base or in the downwind hazard zone. This would constitute a CRITICAL effect since it leaves the base vulnerable to crippling air and ground attacks.

- The Army's emphasis on providing CP for maneuver units led them to develop "soft" portable systems (21:Ch 6). Those systems will not survive the intense conventional attacks expected on the air base (15:Ch 6). On the other hand, the Air Force plans to construct mostly semihardened and survivable CP systems (15:13). They intend to install their transportable systems in hardened structures whenever possible or provide expedient hardening (17:Atch 2, Atch 5). The Army may have difficulty finding survivable locations on crowded A.R. bases for its soft CP systems. This could easily become a MODERATE or even CRITICAL deficiency depending upon how critical the function receiving CP is to sustaining sortie generation.

DETECTION AND WARNING DEVICES

The Air Force defines detection and warning (D&W) devices in light of their purpose.

Detection and warning [devices] are required to provide sufficient time for individuals to either avoid the contamination or to assume the appropriate protective posture. Secondly, the local commander must expeditiously determine the type, concentration, and extent of contamination in order to plan for continued mission operations and report to higher authorities (17:Atch 3).

Army Doctrine

FM 3-3, NBC Contamination Avoidance, contains Army D&W doctrine and provides guidelines helping maneuver units to avoid contamination (21:5-7). It states, "Before units can avoid chemical agents, they must know what type agent is present and where it is located" (21:5-7). Therefore, their doctrine emphasizes chemical reconnaissance "in an area before the unit moves into or through the area" (21:5-7). Chemical reconnaissance teams will proceed ahead of the main body to check for chemicals. If they detect any, they will "move back to a clean area. . . . then move laterally a predetermined distance and direction. . . . then move forward again. . . . until they reach the unit boundary or find a clean route through the contamination" (21:5-8). When contamination is located, they will mark it using standard signs based on NATO Standardization Agreement (STANAG) 2002 (21:2-16; 24:2-5 - 2-7). In recent years the Army began to recognize the

importance of D&W for fixed site operations. In July 1985, the US Army Chemical School coordinated a generic Operational and Organizational (O&O) Plan for fixed site D&W with the Air Force and Marine Corps (34:--). The Army also emphasizes early warning of the approach of toxic clouds from upwind for both fixed sites and maneuver units. The doctrine calls for upwind employment of vapor detectors connected by wire to the unit control center. Since the detectors are several hundred meters upwind of the troops, the commander will have some warning allowing time to assume the appropriate MOPP level (21:5-3 - 5-4).

Air Force Doctrine

While Army D&W doctrine emphasizes reconnaissance (scouting ahead) and early warning, the Air Force assumes initial wide-spread contamination after the attack and, therefore, gears its efforts to learning more about the nature of the chemical environment in which it must operate (13:71; 17:Atch 2). The closest the Air Force came to a comprehensive doctrinal statement for D&W was in its draft Operational Concepts for NBC Defense.

Post-attack Recovery: . . . Emphasis is placed on rapidly confirming the presence or absence of [nuclear, biological, and chemical] NBC contamination. . . . Contamination reports are received from a wide variety of sources including, but not limited to, dedicated NBC survey teams, shelter management teams, security sentries/patrols, and individual personnel in the field. The [survival recovery center] SRC [in the command post] plots the contamination locations on a base grid map . . . Taxi routes for immediate aircraft operations are identified to avoid contaminated areas wherever possible. Decisions concerning the implementation of contamination control operations [decontamination] are made by the SRC commander based on the tactical situation and on inputs from other members of the battle staff (33:2).

The operational concept also calls for "advance warning [of approaching toxic clouds] to provide time for personnel to assume protective postures to reduce casualties" (33:A-1).

Unlike the Army, the Air Force has not consolidated its D&W doctrine. Technical Order (TO) 11C15-1-3, Chemical Warfare Decontamination, Detection and Disposal of Decontamination Agents, provides some general guidance. However, it focuses mainly on isolated pockets of chemicals and chemical spills and not widespread wartime contamination. AFR 355-1 directs each installation to have one or more Disaster Preparedness Support Teams (DPST) to assist in "chemical warfare agent contamination

survey" (13:20). Chapter 6, "Supplies and Equipment", of AFR 355-1 does not even direct Air Force units to obtain specific types of chemical D&W equipment; however, it does obliquely refer the reader to Table of Allowance (TA) 459 to "procure accountable detection [equipment]" (13:32). Chapter 12, "Protective Measures and Disaster Preparedness Operations", outlines basic procedures for chemical detection following an attack. Immediately, "all personnel must survey their immediate area for . . . indications of chemical agent use" (13:71). Since they have only paper and tape detection systems (13:Table 6-1), they can only check for liquid chemical agents. In addition, the commander will have the DPST or other designated teams check for the presence or absence of chemicals (both liquid and vapor) using more sophisticated devices (13:71). They will mark contaminated areas with NATO standard signs described in TO 11H2-1-101, Marking Contaminated and Hazardous Areas.

Joint Doctrine

No current joint doctrine exists. However, as noted above, the US Army Chemical School coordinates related O&O plans with the Air Force and Marines.

Common Items

While the Army and the Air Force developed chemical D&W doctrine in light of their operational concepts of maneuver and fixed site operations, respectively, they still have several common items. Both emphasize providing the commander with information on the nature and location of the chemical hazard to better plan future unit or air base operations. Both also call for advance warning systems to avoid surprises and to avoid going to a higher MOPP (and its encumbrances) prematurely (17:Atch 2; 22:4-4). Finally, if contamination is found, they will use NATO standard signs to mark it.

Conflicting Doctrine and Doctrine Gaps

Even though Army and Air Force D&W doctrine support different operations, there appears to be no doctrinal conflict severely degrading sortie generation or endangering personal safety. However, the Air Force created a LOW degree of effect on sortie generation by publishing bits and pieces of its doctrine in a variety of documents. This deficiency forces each base to develop its own procedures and tactics for pre-attack deployment of detection systems and post-attack reconnaissance (13:Ch 3). For example, units operating in United States Air Forces in Europe (USAFE) must refer to classified plans like USAFE Operational Plan (OPlan) 4102 (S), OPlan 4108 (S), the USAFE Emergency Action File (S) (20:5), and equipment technical orders to develop their D&W schemes. This

could lead to nonstandardized and slow reconnaissance, reporting, and analysis of the on-base chemical situation.

CONTAMINATION CONTROL SYSTEMS

Within the Air Force, contamination control (CC) commonly refers to

Systems that protect equipment and material from contact with liquid [chemical/biological] CB agents; systems to [decontaminate or] neutralize/remove toxic agents from personnel, vehicles, equipment, and air base facilities without adverse effects; and systems that ease the neutralization/removal of toxic agents (such as chemical agent resistant coatings and improved chemical agent resistant materials) (16:4).

Again, because of their different operational concepts (maneuver versus fixed site), the CC doctrine of the two Services developed along divergent paths.

Army Doctrine

The Army clearly places its emphasis on decontamination. It outlines its CC doctrine in FM 3-5, NBC Decontamination, in an easy-to-read format leading the commander through the decontamination decision-making process. As expected, the FM recommends avoiding contamination whenever possible (23:1-1); however, it recognizes units cannot always do so on the battlefield and must decontaminate to restore combat efficiency. Therefore, commanders must understand the need to decontaminate, the types of decontamination available, the unit's tactical situation, and the effects of the decontamination operation on the unit (it is manpower and resource intensive) (23:2-1). The FM lists four principles to guide the commander. These include: "decontaminate as soon as possible" to allow a reduction in MOPP, "decontaminate only what is necessary," "decontaminate as far forward as possible (limit spread [of contamination])," and "decontaminate by priority" the most critical items first (23:2-3).

Taking maximum advantage of maneuverability, the Army developed three levels of decontamination. *Basic Soldier Skills* refers to immediate post-attack actions the individual soldier must take and includes skin decontamination, wipedown of personal equipment, and operator spraydown of vehicle and weapon surfaces the soldier must contact to perform the mission (23:2-3 - 2-5). *Hasty* decontamination "allows a force to fight longer and sustain its mission, while contaminated" (23:2-5). It consists of vehicle washdown using mobile, power-driven decontamination systems and MOPP gear exchange (a procedure to

change into fresh IPE in a contaminated environment) (23:2-5 - 2-6). *Deliberate* decontamination requires the withdrawal of the unit from the contaminated area to rendezvous with a chemical unit. This results in its temporary removal from combat-ready status. It is designed to "reduce contamination to negligible risk levels" and is done as part of a larger unit reconstitution in cooperation with a dedicated chemical unit (35:--). The process consumes large amounts of resources (water and decontaminating solutions), manpower, and time (23:2-6). It consists of removal and replacement of all contaminated MOPP gear; mask decontamination; detailed decontamination of weapons, vehicles, and other equipment; and replenishment of unit stocks of chemical defense items (23:2-4,2-6 - 2-10). Therefore, this reconstitution effort is envisioned only when combat potential has been drained to the point that the senior commander (division or higher) deems the unit combat ineffective (35:--).

Army decontamination doctrine also works in conjunction with its collective protection doctrine. In order to enter a CP system, each soldier follows a standard decontamination process to prevent the spread of chemicals into the shelter interior and limit off-gassing of sub-lethal concentrations (35:--). The Army lists these procedures in FM 3-4, NBC Protection, Appendix C.

Air Force Doctrine

Like its doctrine for detection and warning, Air Force CC doctrine is much less comprehensive than the Army's. AFR 355-1 defines it as "measures taken to avoid contamination and, when necessary, to decontaminate resources to an [undefined] acceptable level" (13:83) and further subdivides decontamination into "expedient" (individual) and "extensive" (wide spread) levels (13:84). Since the Air Force is tied to its air bases, it must continue to operate there even when contaminated, so decontamination becomes a tempting option. But, as noted in FM 3-5, "Terrain decontamination can be so expensive and ineffective that you need to seriously consider doing it all" (23:8-1). In addition, since the air base is subject to repeat chemical attacks, follow on attacks quickly wipe out the benefits of extensive decontamination. Recognizing this, AFR 355-1 recommends pre-attack protection of personnel, equipment, and material from contamination and sustaining operations under chemical conditions following the attack with "primary emphasis . . . on expedient decontamination" (13:71). It also asks commanders to consider the following before extensive decontamination:

- Threat of an additional chemical attack.
- Effect on the operation or mission if not done.

- Time and resources needed versus availability [water is a critical combat sustaining factor on air bases (31:7-8)].

- Contamination type, location, and persistency.

- If natural decontamination is practical under the current weather conditions (13:71).

In addition, extensive decontamination is of little value if the decontaminated asset is immediately recontaminated upon return to a contaminated environment (i.e., the air base) (23:3-14).

However, the Air Force is reconciling CC doctrine with collective protection and individual protective equipment doctrine. Because of its heavy reliance on CP to sustain operations, the Air Force developed CC procedures allowing safe and routine entry and exit of CP. The doctrinal statement in AFR 355-1 is straightforward, "Follow [these] procedures strictly to preclude contamination of toxic free areas [shelter interiors]" (13:71-72). The actual procedures are contained in TO 14P3-1-141 for the ground crew chemical ensemble and TO 14P3-1-131 for the aircrew ensemble. By developing standardized procedures, the Air Force encourages future CP and IPE compatibility. Since both Services use the same IPE, this will increase standardization and interoperability.

Joint Doctrine

No current joint doctrine for CC exists.

Common Items

Both Services see a need to avoid contamination and, if necessary, decontaminate. The Army concepts of *basic soldier skills* and *hasty* decontamination correspond roughly to the Air Force's *expedient* decontamination. *Deliberate* decontamination is virtually the same as *extensive* decontamination. The Army and the Air Force also emphasize the importance of standardizing procedures for entering CP systems. While the procedures differ, they do not seem to be incompatible.

Conflicting Doctrine and Doctrine Gaps

While the Air Force recognizes extensive decontamination may sometimes be necessary, it sees little operational utility for it. Therefore, Army units operating on air bases should not expect deliberate decontamination support from the Air Force. The degree of this deficiency could range from LOW all the way to CRITICAL depending on the Army unit's self

sufficiency and its degree of importance to Air Force sortie generation. For off-base Army units operating in support of the air base, the disconnect is not as critical. They will probably not enter the contaminated air base even if deliberate decontamination support is available (they would immediately be recontaminated as noted above, and the target value of the base leaves the unit even more vulnerable). However, neither Service has determined just "how much" decontamination is "enough" to sustain operations. Until they do, doctrine revisions may not be warranted.

OPERATIONAL AND TRAINING DOCTRINE

While the previous four sections dealt mainly with doctrine and procedures for using CWD equipment, this section will deal with the non-equipment aspects of doctrine by briefly reviewing how CWD fits into other areas of operational doctrine and examining training doctrine.

Army Doctrine

Army CWD and Other Operational Doctrine

The Army incorporates CWD doctrine into its other operational doctrine, most notably in AirLand Battle (4:13; 24:Ch 5). They consider chemicals as simply another environment (like cold, heat, dust, snow, etc.) in which they must operate.

Army Training Doctrine

The Army bases its training doctrine on standards of proficiency outlined in NATO STANAG 2150 (reprinted in FM 3-100, Appendix F) (24:App F). It subdivided these standards into individual skills expected of all soldiers, NBC specialist skills, NBC team and NBC additional-duty personnel skills, and unit skills (24:App F). The Army emphasizes unit training, and most unit evaluations include a requirement to perform the mission in the chemical environment (35:--).

Air Force Doctrine

Air Force CWD and Other Operational Doctrine

Considering the FY 1988 President's Budget for Air Force CWD totalled \$197.1M (16:10), it is ironic that the Air Force's basic doctrine manual, AFM 1-1, does not even address chemical warfare or chemical warfare defense. In fact, those words and phrases do not appear in the manual at all. The closest AFM 1-1 comes to directing preparation for CWD is in paragraph 4-3. "To ensure the readiness of our forces, commanders must develop

and implement training programs that build required warfighting skills and that simulate, as closely as possible, the combat environment in which we expect to fight" (9:4-7). Except for AFM 1-7, Chemical Warfare Doctrine, and brief mentions in AFM 1-10, Combat Support Doctrine (11:2-4), and AFM 2-53, Doctrine for Amphibious Operations (29:Ch 8), the rest of the Air Force doctrine manuals largely ignore CWD. By placing CWD in a separate category of doctrine, it may not receive emphasis equal to its importance.

Air Force Training Doctrine

The Air Force also trains to STANAG 2150 standards of proficiency as outlined in AFR 8-18, Air Force Standardized Disaster Preparedness Training and Evaluation (13:1,36). All personnel stationed in or deployable to overseas chemical high threat areas receive CWD training (13:36). Since the Air Force has no dedicated Chemical Corps, it forms chemical specialized teams (shelter management, reconnaissance, and decontamination) from additional duty personnel (13:20-21) and provides them limited specialized training to meet STANAG 2150 standards (13:Table 7-1). AFR 355-1 requires all airmen to "demonstrate performance of their wartime duties while wearing [chemical warfare] CW protective clothing and equipment" (13:39). In addition, it requires units to conduct periodic "attack response exercises" and to evaluate "mission accomplishment in a nuclear, biological, chemical, and conventional environment as appropriate to the unit threat" (13:28,30-31).

Joint Doctrine

A joint regulation FM 101-40/NWP 36(D)/AFR 355-5/FMFM 11-6, Armed Forces Doctrine for Chemical Warfare and Biological Defense, June 1975, is still an active Air Force publication. However, this regulation is outdated and so general as to have only limited value.

Common Items

The Army and Air Force both base their training programs on STANAG 2150 standards of proficiency and require individuals and units to demonstrate an ability to accomplish their missions in a chemical environment.

Conflicting Doctrine and Doctrine Gaps

By and large, the Army takes CWD operational doctrine more seriously than the Air Force (to be expected considering the Army has a dedicated Chemical Corps and a doctrine office in its Chemical School while the Air Force has fewer than 190 disaster preparedness officers (37:--), and it has just one major assigned (part time) to develop and coordinate CWD

doctrine (36:--)). In fact, the Army rewrote almost all of its CWD doctrine in the mid-1980s to support AirLand Battle. (4:13) while the most recent Air Force updates have been a change to AFR 355-1 and the publication of AFR 355-8. The lack of an Air Force doctrine statement for CWD in AFM 1-1 and other doctrine manuals is a LOW degree of deficiency since other publications contain CWD doctrine (albeit in bits and pieces).

COMMAND AND CONTROL DOCTRINE

This section will examine how the Services react to chemical attacks by identifying the attack alarm signals used, who can order them, and the individual soldier's or airman's reaction. Then it will describe the systems used to assess attack data and how the data is passed to other interested parties.

Army Doctrine

Army Attack Alarm Signals

FM 3-4, NBC Protection, outlines Army attack alarm signals. While the Air Force considers "all attacks include chemical agents until otherwise indicated" (10:2-1; 13:71), the Army does not. The commander will generally wait until confirming a *chemical* attack to assume MOPP 4 unless intelligence indicators convince him the next attack is likely to include chemicals (4:14; 24:Ch 3). A number of signals are available for conveying the MOPP 4 order. *Vocal* signals include shouting "GAS" or "SPRAY." *Sound* signals include "rapid and continuous beating" on metal, "short blasts on a vehicle horn or other suitable device," and "interrupted warbling siren sound, such as alternating 10 seconds on and 10 seconds off." *Visual* signals consist of putting on one's own mask, placing "both arms horizontally sideways with doubled fists facing up. . . . [and] move fists rapidly to your head and back to the horizontal position." *Audiovisual* signals refer to those presented by automatic chemical detector/alarm systems and those passed over radio and telephone systems (22:4-4 - 4-5; 24:2-7 - 2-9).

Army Authority to Order Attack Alarm Signals

As noted in the IPE section, the Army delegates authority to order MOPP levels to its most junior leaders (24:3-4). Therefore, in a given battle area, adjacent units may be in different MOPP levels depending upon the commander's assessment of the situation. The Army allows "automatic masking" by the individual soldier only when a chemical detector alarms, "a positive reading [is] obtained on detector paper. . . . or exhibition by individuals of chemical agent symptoms" (24:3-7).

Individual Soldier's Reaction

Upon noting a chemical attack is taking place or upon seeing or hearing one of the attack alarm signals listed above, a soldier will immediately don the protective mask, warn others nearby, and go to MOPP 4 unless the commander orders another MOPP (22:4-2 - 4-5). Prior to an attack, a soldier will change MOPP level only when ordered (22:4-2).

Army Attack Assessment and Data Handling

The Army fully adopted the NBC plotting, warning, and reporting system established by NATO STANAG 2103/Allied Tactical Publication (ATP) 45 in its current edition of FM 3-3, (21:2-1). ATP 45 outlines the NATO standard method of collecting raw NBC attack data, passing it to a trained team for evaluation, generating warnings to affected units, and passing processed information to higher headquarters for correlation with other attack data (21:2-6 - 2-9). Chapters 2 through 6 of FM 3-3 contain information from ATP 45 pertaining to land and air forces. ATP 45 specifies six different standard reports for passing various types of NBC data, and the Army incorporates them into its NBC Warning and Reporting System (NBCWRS) (21:2-1). The NBCWRS overlays the existing Army command and control structure and uses the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) to standardize the message formats (21:2-1). Operating in and supporting the NBCWRS is an inherent responsibility of all Army units at all echelons (21:2-6 - 2-7).

Air Force Doctrine

Air Force Attack Alarm Signals

The Air Force bases its attack alarm signals on NATO STANAG 2047, Emergency Alarms of Hazard or Attack (NBC and Air Attack Only) (8:Annex A; 13:1), and ties them directly to the Air Force MOPP system (see Figure 2-2) (13:73; 14:Atch 1).

Air Force Authority to Declare Attack Alarm Signals

The Air Force uses a centralized approach to declaring attack alarm signals on the air base. Due to the large number of people crowded into a very small area, Air Force base commanders cannot allow individual unit commanders to declare their own signals; it could lead to widespread confusion during and after attacks. Attack warning indications are channelled to the Survival Recovery Center (SRC) in the wing command post where the wing commander and battle staff assess them. If they deem an increase in the attack alarm condition necessary, the

The following attack alarm signals are based on NATO STANAG 2047 and are used by Air Force units in the NATO Central Region (13:73; 14:Atch 1; 19:--).

Attack Alarm Condition	Visual Signal	Audible Signal	Airman's Reaction
Yellow (Attack Probable)	Yellow Flag	"ALARM YELLOW"	MOPP 1*
Red (Attack Imminent or In Progress)	Red Flag	"ALARM RED" Unbroken warbling for one minute. Long blasts on wind instruments or horns.	MOPP 4 Take Cover
Black (NBC Contamination Present or Suspected)	Black Flag	"ALARM BLACK" Interrupted warbling. Short blasts on wind instruments or horns. Beating metal. "GAS GAS GAS"	MOPP 4**
All Clear	Remove flags	"ALL CLEAR"	MOPP 0

(*) Following base-wide declaration of Alarm Yellow, unit commanders may be authorized to place their units in MOPP 2, if needed. But the individual airman is trained to immediately assume MOPP 1 whenever Alarm Yellow is declared (14:Atch 1; 19:--).

(**) Under limited circumstances, the installation commander may authorize MOPP 3 to allow performance of certain critical tasks (14:2).

Figure 2-2. Air Force Attack Alarm Signals.

commander directs the command post controller to signal the new alarm. The controller then broadcasts a voice announcement over the base public address system and activates other signals (sirens, etc.), if needed (13:73-74).

Individual Airman's Reaction

When airmen recognize one of the attack alarm signals, they take the immediate actions listed in Figure 2-2. In the fog of an intense European war, the Soviets can attack air bases with little or no warning; therefore, the Air Force will "assume that all attacks include chemical agents until otherwise indicated" (13:71) forcing an immediate assumption of MOPP 4 upon the first indication of any kind of attack (14:Atch 1). If any attack occurs prior to the commander's declaration of Alarm Red, airmen are trained to take the appropriate actions for Alarm Red (13:71). While not specifically spelled out in Air Force doctrine, STANAG 2047 lists several other immediate actions to perform. First, ensure everyone else in the area received and understood the signal and took the appropriate personal protective measures. Second, the command and control section of the base disaster preparedness OPlan or equivalent normally tasks certain units to post colored alarm signal flags when the alarm condition changes (13:24). Finally, airmen who control radio and telephone nets will pass the warning over those nets (8:--).

Air Force Attack Assessment and Data Handling

The Air Force also uses STANAG 2103/ATP 45 for its units operating in the NATO arena (20:Atch 7). However, it did not republish ATP 45 as a formal USAF document. Instead, it relies on reprinting ATP 45 as is and passing it to units without using normal Air Force publications distribution channels. As a result, some units, especially in the US, have difficulty obtaining copies of ATP 45, and no standard method exists for getting changes to the field. In addition, no formal Air Force NBCWRS exists. Bases in USAFE forward reports according to the standard operating procedures (SOP) of their parent NATO Allied Tactical Air Force (ATAF) or, for units in the UK, according to AFR 355-1, USAFE Supplement 1, Atch 9. The Air Force does, however, subscribe to JINTACCS and uses the standard message formats (12:3-87-1 - 3-93-1, D-145 - D-158).

Joint Doctrine

No current joint doctrine exists for command and control.

Common Items

In both Services, the immediate reaction of a soldier or airman upon receipt of an attack warning is to assume MOPP 4. In addition, both use NATO standard procedures for gathering and evaluating chemical attack data and JINTACCS message formats for passing the data.

Conflicting Doctrine and Doctrine Gaps

Several problems exist in command and control doctrine.

- The differences in Army and Air Force attack alarm signals create a CRITICAL deficiency. Because the signals are so different, they will create confusion whenever Army and Air Force personnel operate together unless the troops have had at least some joint training. This confusion will lead to hesitation and casualties during critical periods (i.e., when under attack or if Alarm Red or Alarm Black is declared).

- The different Service approaches to granting authority to declare attack alarm signals also creates a CRITICAL deficiency. Unless the Army junior commanders understand how the Air Force declares alarm signals on the air base, they will follow Army doctrine and declare MOPP levels for their unit. This places the soldier in a dilemma -- follow the orders of the unit commander or the orders coming through the Air Force warning system? It can also create confusion in airmen who see Army personnel operating in a MOPP different from their own.

Note: For soldiers operating with USAFE units on a routine basis, the problems above may not be so severe. However, for personnel reinforcing Europe from the US and unfamiliar with USAFE procedures, the problems become increasingly more severe.

- The Air Force has doctrine gaps concerning its participation in the NBCWRS. Foremost, while it ratified STANAG 2103 and agreed to use ATP 45 (at least in NATO operations), it never developed an Air Force publication for getting that information to the field nor did it provide direction from the Air Staff to use ATP 45 (the only direction is in USAFE Sup 1 to AFR 355-1 which applies to USAFE units only, not to additive forces). In addition, while it adopted the JINTACCS message formats, it did not specify to whom reports must be passed. These items form a LOW degree of deficiency. The lack of an effective NBCWRS with readily available reference materials could cause a base to stay in a restrictive MOPP longer than necessary. However, these problems could become CRITICAL if they lead to casualties caused by delays in the transmission of and reaction to warning reports.

Chapter Three

ASSESSMENT OF ARMY AND AIR FORCE DOCTRINE FOR CHEMICAL WARFARE DEFENSE JOINT OPERATIONS

In preparing for war, we must always begin with the assumption that the enemy is not only as brave and as able as we are, but also that he will always try to act in ways least advantageous to us.

General Giulio Douhet, Command of the Air (1:--)

Overall, the Army and the Air Force share a great deal of common operational CWD doctrine for supporting air base operations. Both now use the Mission-Oriented Protective Posture (MOPP) system to guide the wear of individual CWD equipment. Therefore, when the commander orders a particular MOPP, soldiers and airmen will react alike. In addition, all soldiers and airmen receive CWD training based on standards of proficiency outlined in NATO STANAG 2150. This standardizes their training not only with each other, but also with the NATO allies. Both Services also see collective protection as a key to sustaining operations in the chemical environment. They also adopted similar CP entry-exit procedures allowing soldiers to safely enter Air Force CP systems, should the need arise. Each Service emphasizes the importance of chemical detection and warning systems, albeit for different reasons. In decontamination, they have common ideas concerning immediate post-attack decontamination by the individual soldier or airman. They use NATO standard signs to mark contamination. For passing critical CWD information, they have made tremendous strides by standardizing NBC message format in JINTACCS using the NATO STANAG 2103/ATP 45 system. These common areas are the basis for successful, joint operations on the air base.

However, several serious doctrinal problems, if left uncorrected, endanger sustaining air base operations in the chemical environment. They result from different approaches taken in developing CWD doctrine. The Army concept of moving around or out of contamination is not fully compatible with CWD operations around an immovable point, like an air base. Perhaps the most critical problem, in terms of causing death or serious injury, is the lack of common attack alarm signals. In the worst case situation (soldiers operating on an air base), the lack of Army training on Air Force signals could cause a

delay in assuming MOPP 4 when the Air Force declares Alarm Red (attack imminent) or Alarm Black (NBC contamination present or suspected). In addition, while the Army grants authority to declare MOPP to its junior leadership, the nature of air base geography (constrained and crowded) forces the Air Force to centralize control. This could lead to Army units being in a different level of attack preparedness (a different MOPP) than their partner Air Force units. Also related is the Army concept of using "mask only" in certain chemical situations. The Air Force frowns upon this because it leaves the individual poorly prepared to react to a no-notice, follow on attack.

While the above problems could lead to death or injury of personnel, other problems might degrade the ability of the air base to sustain operations in the chemical environment. The Army's concept of providing collective protection for several hours does not complement the Air Force's operational requirement of seven continuous days of sustainability. If Army units must withdraw from the contaminated air base after less than a day, the ability of the base to continue operations would be questionable since it would be more vulnerable to air and ground attack. Both Services also need to review their concepts for deliberate/extensive decontamination to determine what type of decontamination is really needed on the air base. Neither Service can support the resources required for repeated decontamination.

However, these problems are not insurmountable; most can be solved by doctrine changes or development of new doctrine. In particular, the Air Force would benefit from developing a CWD doctrine publications set to support AFM 1-1 and AirLand Battle just like Army FMs 3-100, 3-3, 3-4, and 3-5 support AirLand Battle and Rear Battle. The Army, in turn, can improve its fixed site operations by adopting Air Force concepts for CP, attack alarm signals, and command and control. To improve interservice standardization, they should develop joint publications wherever possible. The Air Force could subscribe to FMs 3-3, 3-4, and 3-5 if they were expanded to cover fixed site operations. Specific recommendations for improvement are listed in the Appendix.

As the two Services reconcile their CWD doctrine, they must remember doctrine is not a static description of the best way to conduct war. It must adapt to meet changing situations and new challenges to allow the aerospace mission to continue at the contaminated air base. This paper has highlighted a few critical disconnects of existing joint, fixed site CWD doctrine. It has also shown areas where Army and Air Force doctrine complement each other. By building on the common components and correcting the deficiencies, planners in each Service will be able to refine the doctrine to the point where it successfully supports sustained aerospace operations.

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APPENDIX

SPECIFIC RECOMMENDATIONS

This appendix outlines specific problems and recommendations for improvement of Army and Air Force doctrine for joint, fixed site chemical warfare defense operations.

1. **PROBLEM:** The Air Force has not published a complete set of CWD doctrine supporting Air Force theater missions and specialized tasks outlined in AFM 1-1. AFM 1-1 does not mention operations in a chemical environment.

DEGREE OF EFFECT: Low. Lack of adequate doctrine inhibits effective and standardized planning for CWD operations. In addition, the Army has no reference document for determining how the Air Force intends to operate in that environment.

RECOMMENDATIONS:

a. Include wording in AFM 1-1 directing the Air Force to plan theater operations in light of the chemical warfare threat. The aerospace operating environment includes not only the atmosphere and space, but also the ground bases from which those air breathing and space weapons must operate.

b. Rewrite and expand the CWD portion of AFM 1-7 to serve as the central doctrine document for CWD operations (similar to FM 3-100). Use the Draft Air Force Operational Concepts for NBC Defense as a framework. Place the retaliatory CW doctrine now in AFM 1-7 into another publication.

c. Using AFR 355-8 (IFE) and the draft AFR 355-3 (CP shelter operations) as examples, develop one doctrine regulation for chemical detection and warning and another for contamination control. Use the appendices to the Draft Air Force Operational Concepts for NBC Defense as a framework. If possible, produce joint publications for MOPP, CP, D&W, and CC. If not feasible, assure the regulations and their corresponding field manuals complement each other.

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RECOMMENDED OFFICE OF PRIMARY RESPONSIBILITY (OPR): The Air Force Disaster Preparedness Resource Center (AFDPRC) is one possible agency to coordinate this program.

2. PROBLEM: The Army does not formally train its soldiers to respond to the attack alarm signals used on Central Region air bases.

DEGREE OF EFFECT: Critical. Incorrect or slow response to Air Force attack alarm signals could lead to death or serious injury. Entire Army units could be affected.

RECOMMENDATION: Since the Army has already ratified NATO STANAG 2047 (8:iii), they should consider including the standardized signals in FMs 3-4 and 3-100 along with the signals they plan to use for field operations. As an interim fix, they should consider issuing AF Visual Aid 355-5 (the wallet-sized version of USAF VA 355-6) to troops planning to deploy to or through Central Region air bases.

RECOMMENDED OPR: HQ TRADOC and US Army Chemical School.

3. PROBLEM: Army and Air Force concepts for using MOPP 3 and "mask only" differ.

DEGREE OF EFFECT: Critical. Since the air base expects repeated enemy attacks, all personnel on the base must be in a constant state of readiness to respond to a no-notice or short-notice attack that might include chemicals. MOPP 3 leaves the hands exposed to chemicals and "mask only" leaves virtually the entire body exposed.

RECOMMENDATION: In FM 3-4, consider adding guidance concerning the use of MOPP 3 and "mask only" on fixed sites. Explain that the air base commander will determine what MOPP is in effect when Army personnel are working at Air Force fixed sites.

RECOMMENDED OPR: HQ TRADOC and US Army Chemical School.

4. PROBLEM: The Army concept of allowing junior unit leaders to determine the MOPP for their units violates the Air Force concept of the air base commander determining the attack alarm signal and MOPP for the entire base.

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DEGREE OF EFFECT: Critical. Due to the crowded and constricted terrain, centralized control of attack alarm signals and MOPP is essential for the base to rapidly take protective measures for an attack. Allowing Army units to set their own MOPP will result in confusion on the base when, for example, some people are in MOPP 4 while others may have gone to a reduced MOPP. This could lead to death or serious injury in the confusion of battle.

RECOMMENDATION: FM 3-4 should include a chapter on joint CWD procedures at fixed sites.

RECOMMENDED OPR: HQ TRADOC and US Army Chemical School.

5. PROBLEM: The Army's sustainability goals for using collective protection are considerably shorter than the stated Air Force goal of seven continuous days of operations.

DEGREE OF EFFECT: Potentially critical. If Army units must withdraw from the contaminated air base and surrounding areas due to a lack of CP, the air base would be more vulnerable to enemy air and ground attack jeopardizing its ability to support aerospace missions.

FURTHER RESEARCH NEEDED: Army and Air Force operational planners and research and development personnel need to meet to determine what type of CP the Army needs to support air base operations, which service will operate the CP, and who will develop and pay for it.

RECOMMENDED OPR: Office of the Secretary of the Air Force (SAF/AQPN), HQ USAF/XOORB and HQ TRADOC with assistance from HQ Aeronautical Systems Division/Life Support SPO (ASD/AESD) and US Army Chemical Research, Development, and Engineering Center (CRDEC).

6. PROBLEM: Unlike the Army, the Air Force has no central OPR dedicated to CWD doctrine development and coordination.

DEGREE OF EFFECT: Low (see Problem 1).

RECOMMENDATION: Task AFDPRC to be the Air Force center of expertise for CWD doctrine, and man it accordingly. Authorize

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it to work directly with OJCS/J-7, HQ TRADOC, and US Army Chemical School to develop joint doctrine to be coordinated by the Air Staff.

RECOMMENDED OPR: HQ USAF/XOORB and HQ USAF/XOXFD.

7. PROBLEM: Army and Air Force decontamination doctrine for on base operations needs further development.

DEGREE OF EFFECT: Moderate. Lack of resources on the air base for deliberate decontamination could hamper Army operations. Nonstandard terminology for the different levels of decontamination could cause confusion. Air Force concepts of pre-attack covering or sheltering of exposed equipment are not clearly outlined in Army FMs.

RECOMMENDATION: Extract the decontamination doctrinal information from Air Force TO 11C15-1-3 and place it in an Air Force contamination control regulation. Reconcile the regulation with FM 3-5, and produce a joint publication, if possible. Since the Army already has standardized terminology for the different levels of decontamination, the Air Force should adopt them. FM 3-5 should address fixed site pre-attack contamination avoidance in more detail.

FURTHER RESEARCH NEEDED: Both services need to analyze the need for deliberate decontamination on a fixed site subject to repeated chemical attacks. If such decontamination is needed, commanders need more guidance on determining when and how to do it (perhaps a decision/logic tree).

RECOMMENDED OPR: AFDPRC and US Army Chemical School with technical assistance from HQ ASD/AESD and CRDEC. Air Force tasking for further research should be included in PMD 4026(6)/64601F/27593F by HQ USAF/XOORB and SAF/AQPN.

8. PROBLEM: Aside from a description of message text formats in AFP 102-2, Vol 1, the Air Force has no publication implementing NATO STANAG 2103/ATP 45 and STANAG 2104.

DEGREE OF EFFECT: Low (potentially Critical). Operations and training on NBC warning and reporting are hampered both for Air Force units in the theater and those CONUS units designated to deploy overseas. Lack of training and proper reference

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materials could lead to confusion in battle and several undesirable outcomes. Potentially, the base stays in a restrictive MOPP longer than necessary, fails to quickly respond to a contamination or attack warning, or fails to pass critical NBC data and warnings to higher headquarters and adjacent units in a timely manner.

RECOMMENDATION: The Air Force should adopt FM 3-3 as an Air Force publication. FM 3-3 contains the pertinent portions of STANAG 2103/ATP 45, and the Army keeps it current. The Army has already incorporated JINTACCS message formats into FM 3-3.

RECOMMENDED OPR: AFDPRC as tasked by HQ USAF/XOORB and with approval of SAF/AD and HQ TRADOC.