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SECRETARY OF THE AIR FORCE

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Civil Engineer

PERSONNEL PROTECTION AND ATTACK ACTIONS

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This manual implements AFPD 32-40, *Disaster Preparedness* and AFI 32-4001, *Disaster Preparedness Planning and Operations*. It provides explanation and procedures for the Air Force shelter program, contamination control area operations, mission-oriented protective postures, and wartime attack actions to each level of command within the United States Air Force. This AFMAN also implements North Atlantic Treaty Organization Standardization Agreements 2002, 2047, 2083, 2103, 2112, 2150, 2352, 2412, 2424, 2429, 2866, 2941, 2957, 2984, 4145 and 4192 and Air Standardization Coordinating Committee Standard 84/7, 84/18, 84/2A, and American, British, Canadian, and Australian Quadripartite Standardization Agreements 989, 1042, and 1043. **Records Disposition.** Ensure that all records created by this manual are maintained and disposed of IAW AFMAN 37-139, *Records Disposition Schedule*.

SUMMARY OF REVISIONS

This revision incorporates Interim Change IC 2001-1. This interim change provides guidance for the Air Force Contamination Control Area (CCA) processing for the Battle Dress Overgarment (BDO), Chemical Protective Overgarment (CPO), Joint Fire Fighter Integrated Response Ensemble (J-FIRE) and the Explosive Ordnance Disposal (EOD) Level A Suit. The Contaminant Air Processing System (CAPS) is the Air Force standardized CCA processing system and will be used to the maximum extent possible. However, not possessing the CAPS will not preclude implementing Air Force standardized processing procedures. It also includes mission critical equipment (MCE) refurbishment procedures. A "|" indicates revisions from the previous edition.

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Chapter 1

SHELTER PLANNING

1.1. Objective. The objective of the shelter program is to provide the best available physical protection for Department of Defense personnel from the effects of war or disaster. Key elements to a successful personnel shelter program include adequate shelters, a base population familiar with shelter procedures, a competent staff trained in shelter management, an ability to activate and close shelters at the appropriate times, an ability to stock shelters with required supplies and equipment, and an ability to occupy shelters for extended periods.

1.2. Major Commands (MAJCOM) and Air Reserve Components (ARC). AFI 32-4001, *Disaster Preparedness Planning and Operations* contains functional responsibilities for these organizations. Furthermore, to carry out the shelter program, they should:

1.2.1. Plan for nuclear, biological, chemical, and conventional (NBCC) protection based on the threat for both in-place and deployed operations, also establish planning requirements for natural disaster and catastrophic major accident situations. Where possible, they should develop a single shelter management guide for use at command locations.

1.2.2. Specify training and evaluation requirements (type and duration) for performing maintenance on shelter-unique equipment and installation specific sheltering systems.

1.2.3. Specify installation shelter exercise requirements for peacetime and wartime contingencies. Address procedures and checklists, command and control, shelter supplies management, shelter occupation operations, extended sheltering operations, exposure control, and contamination control area (CCA) processing, to include open air processing, (as appropriate to the threat and scenario) during shelter evaluation.

1.3. Installation Commander. To implement a successful shelter program, the installation commander should:

1.3.1. Develop a comprehensive protection program to provide sufficient shelter spaces for peak on-base population, for military and emergency essential civilians (include added forces projections for teams and supplies). Determine the type and quantity of shelters based on the threat, both peacetime and wartime. Consider the use of open air CCAs and toxic free areas (TFAs) in chemical-biological (CB) threat areas.

1.3.2. Plan shelter occupancy on a worst case basis to support assigned personnel and personnel that are relocated from another installation due to evacuation in areas subject to catastrophic natural disasters. Include peacetime disaster shelter operations, to include appropriate evacuation activities, in local planning documents.

1.3.3. For preparatory actions covering contingencies are concerned, consider a phased approach where limited resources are always available for contingency response, but total program requirements aren't activated until the appropriate state or stage of alert. In the event evacuation is required, consider a phased approach where non-essential activities are terminated early in the process and life saving capabilities are maintained until the last feasible stage.

1.3.4. Include sheltering scenarios during exercises using MAJCOM criteria in conjunction with para. **1.2.3.** and AFI 32-4001.

1.3.5. See AFI 32-4001 for guidance on personnel relocation.

1.4. Unit Commanders. Unit commanders should:

1.4.1. Tailor MAJCOM and ARC guidance and/or shelter materials and publish unit and facility checklists for shelter operations as required.

1.4.2. Plan supply and resupply actions to support extended shelter operations. This should include planning for shelter operations for 14 consecutive days after nuclear fallout peaks; for 7 consecutive days after the onset of chemical-biological contamination; for shelter operations in deployed locations; and for shelter operations during major accidents and natural disasters.

1.4.3. Identify enough shelter management team (SMT) members to provide 24-hour coverage in the shelter. Ensure SMT members do not have conflicting duties. If required by base support plans, identify and train selected unit personnel identified for mobilization in shelter management techniques. Paragraph **1.12.3.** contains information on shelter manning requirements. If a home station NBCC threat does not exist, training is only required for the appropriate number of shelter management personnel necessary for natural disaster/major accident activities.

1.4.4. Train SMTs to operate, maintain, and perform minor troubleshooting of the equipment within the shelter. This should include filtration systems, air conditioning and heating systems, electrical systems, sanitation systems, and communications systems. For additional training, unit commanders should:

1.4.4.1. Request technical training on shelter management fundamentals from the CE readiness flight for all assigned SMT members IAW AFI 32-4001. Training for home station nuclear fallout shelters does not need to be accomplished until an increase in threat. MAJCOMs and ARC should define training time schedules for nuclear fallout shelters.

1.4.4.2. Request systems (i.e. collective protection facilities and components) training from the Civil Engineer or functional manager.

1.4.4.3. Request shelter-stocking training from Services, when required.

1.4.5. Ensure required equipment inspections are performed according to technical orders and MAJCOM or ARC guidance.

1.4.6. Ensure routine maintenance actions on detection instruments, available collective protection facilities, and other personnel protection items not specifically tasked to maintenance functions are performed.

1.4.7. Develop a shelter floor plan diagram. Changes should be made any time structural modifications are made to the shelter.

1.4.8. Consider assigning personnel with the same critical Air Force specialties to different shelters to enhance survivability.

1.4.9. Stagger work shifts and rest cycles, as the mission permits, to minimize bottlenecks during shelter processing.

1.4.10. Consider the mission, work and rest cycles, and the previous and expected exposure to contamination before directing personnel to duty outside the shelter.

1.4.11. Oversee the operation of the exposure control system. When deactivating the shelter, units should collect all radiological logs and individual radiological dose records. These logs should be given to the director of base medical services upon termination of shelter operations.

1.4.12. Assign unit personnel to accomplish expedient shelter hardening measures as required.

1.5. Medical Services. The director of Base Medical Services should:

1.5.1. Plan for medical treatment during shelter operations.

1.5.2. Specify first aid kit requirements for shelter operations. If not pre-positioned in shelters, provide guidance concerning the delivery of these assets.

1.5.3. Plan for, train, and equip the Wartime Medical Decontamination Team (WMDT). The primary mission of the WMDT is to provide capability to remove or neutralize NBC agents on wartime casualties immediately prior to being admitted to the Medical Treatment Facility (MTF). This includes, as a minimum, planning for patient decontamination layout, resources, and procedures at CCA/TFA locations.

1.6. Services. Services Squadron Commander should:

1.6.1. Locally determine the level of shelter stocking support necessary to meet OPlan and natural disaster planning requirements. Develop a shelter stocking plan to issue available food, water (O & M funded), and clothing stocks to shelter supervisors. Ensure wing units provide appropriate levels of support, as required, example: (Transportation: vehicles and drivers, Supply: water and clothing, etc.).

1.6.1.1. Not physically stock shelters during local exercises and IG inspections. The shelter-stocking plan will be evaluated for locally determined requirements based on Oplan and natural disaster planning.

1.6.1.2. Provide the Shelter Management Teams (SMT) guidance on shelter stocking contained in the shelter stocking plan and local disaster planning guidance.

1.6.2. Within the shelter-stocking plan, address the need for self-directed recreational activities during shelter operations. Take into consideration what can be purchased upon execution.

1.7. Base Civil Engineer (BCE). The BCE should:

1.7.1. Plan for expedient hardening to increase shelter protective capability during contingency operations. Assist with bunker and revetment installation and repair.

1.7.2. Direct the performance of preventive maintenance and unit level maintenance on available collective protection systems, to include those categorized as equipment i.e., survivable collective protection systems (SCPS), transportable collective protection systems (TCPS), etc.

1.7.3. Provide and maintain systems delivering potable water used to sustain contingency operations.

1.7.4. Train SMTs in facility and equipment operation and emergency troubleshooting and repair.

1.7.5. Through the Readiness Flight , trains designated SMTs in:

1.7.5.1. Train designated SMTs in:

1.7.5.1.1. Basic concepts of shelter management and operations including CCA management and processing.

1.7.5.1.2. Selected shelter equipment use.

1.7.5.1.3. NBCC-related subjects as required.

1.7.5.1.4. Post-attack damage assessment procedures, to include reporting requirements.

1.7.5.1.5. Exposure control procedures when applicable.

1.7.5.2. Plan for implementation of CCA/TFA procedures to include site selection, processing procedures, risk assessment, etc.

1.7.5.3. Coordinate with Life Support on aircrew CCA processing.

1.8. Life Support. Life Support should:

1.8.1. Plan and prepare for personnel deploying to locations where Aircrew Chemical Defense (ACD) shelter facilities exist.

1.8.2. Prior to deployment become familiar with the processing procedures, capabilities, and other operational aspects of various collective protection systems.

1.8.3. Make every effort to co-locate aircrew CCA/TFA operations with base populace CCA/TFA operations established by the SRC and CE Readiness Flight. See AFM 11-303, *AirCrew Life Support Combat Operations* for aircrew processing procedures. Logistics, security, chemical detection, hazard predictions, and site selection established by the SRC/CE Readiness Flight will enhance aircrew processing.

1.9. Security Forces. Incorporate into unit checklists security requirements necessary to protect CCA/TFA operations, either on or off base.

1.10. Transportation. Incorporate into unit checklists transportation requirements necessary to sustain CCA/TFA operations, either on or off base.

1.11. Individual. Know the location of their protective shelter and understand shelter processing procedures.

1.12. Shelter Requirements.

1.12.1. Air Force units are allowed to use War Reserve Materiel (WRM) to support shelter operations during major accidents, peacetime natural disasters, and other civil emergency relief operations. WRM is authorized to support our National Military Strategy to fight to win two nearly simultaneous major theater wars (MTWs). Accordingly, peacetime use of WRM must be approved only after considering the impact on that strategy, and the ability and timeliness of reconstituting the WRM. WRM assets are to be the last option. Prior to any peacetime use approval, requesting organizations will make every practical effort to satisfy the requirement using alternative means of support. AFI 25-101, *War Reserve Materiel (WRM) Program Guidance and Procedures*, provides more information on the WRM program.

1.12.2. There are two types of personnel shelters: emergency operations shelters, where personnel perform essential functions; and rest and relief shelters, where personnel obtain rest and relief between work shifts.

1.12.2.1. Rest and relief shelterees normally should not use emergency operations shelter space unless they work in the emergency operations shelter.

1.12.2.2. Shelter space in medical facilities normally should not be used by the base populace for rest and relief purposes.

1.12.3. Staffing consists of shelter supervisors, CCA supervisors, and assistants.

1.12.3.1. Minimum team size for emergency operations and rest and relief shelters used only for nuclear fallout is one shelter supervisor and one exposure control monitor per shift.

1.12.3.2. Minimum team size, for emergency operations and rest and relief shelters used for CB protection is one shelter supervisor and one CCA supervisor per shift.

1.12.3.3. The number of attendants required for CCA processing depends on the skill of the base populace in regards to processing, the protective ensemble they are wearing (BDO versus J-FIRE for example), and the required flow rate into the TFA. See **Attachment 2** for duties.

1.12.3.4. Minimum team size for emergency operations and rest and relief shelters used for natural disaster or major accident relief is one shelter supervisor and one assistant per shift.

1.12.4. For nuclear fallout protection, planning factors should include:

1.12.4.1. Providing one shelter space for each person based on the projected peak on-base population of military and emergency essential civilians.

1.12.4.2. Using Federal Emergency Management Agency supplies and equipment, if available.

1.12.5. In overseas areas, the threat to the installation determines CB protection requirements. CB protection should be provided by using available collective protection systems or establishing open air CCAs and TFAs. Units should:

1.12.5.1. Provide one space per two personnel assigned to a rest and relief shelter.

1.12.5.2. Ensure positive overpressure of filtered air is provided in collective protection facilities to keep CB agents out of the TFA.

1.12.5.3. Ensure outward airflow through the airlocks and CCA is provided to minimize hazards.

1.12.5.4. Consider the use and location of open air CCAs and TFAs.

1.12.6. Conventional protection should be provided for emergency operations and rest and relief shelters.

1.12.6.1. Many facilities that provide nuclear fallout and biological and chemical protection also protect against conventional munitions.

1.12.6.2. Expedient hardening, berming, or revetting can provide additional conventional protection.

1.12.6.3. Bunkers and revetments provide expedient protection for personnel working outside when an attack occurs. They can be used on an as-required basis; however, do not assign them as shelter spaces.

1.12.7. Natural disaster shelters should be selected based on their structural and personnel housing capabilities in relation to the type of disaster(s) likely to occur in the area.

1.12.8. **Attachment 2** and **Attachment 3** contain additional guidance on shelter preparation, operation and radiological exposure control.

Chapter 2

OPEN-AIR CONTAMINATION CONTROL AREA (CCA) AND TOXIC FREE AREA (TFA) OPERATIONS

2.1. General Information.

2.1.1. CCAs are essential to sustained operations in a chemical environment. They limit the spread of contamination into a TFA so personnel can work or obtain rest and relief without wearing individual protective equipment (IPE). They also provide a controlled environment to safely remove contaminated IPE.

2.1.2. The hostile use of chemical agents in liquid form either neat (unthickened), thickened, or solid (dusty) form against our base populace will almost certainly force the creation of a CCA, regardless of the agent or external factors involved. One or both of the following situations will likely occur after the attack.

2.1.2.1. If an air base is attacked with chemical agents in liquid or solid form, it is possible that the agent's persistency will be greater than the people's ability to "ride it out". Consequently, the work force will require some degree of rest and relief in order to sustain mission operations. This rest and relief will primarily be obtained by processing people through a CCA into a TFA.

2.1.2.2. In most cases, a small percentage of the base population is likely to have their chemical protective overgarment (OG) contaminated with agents in liquid form at the time of the attack. Still others will contaminate their OG during post-attack operations. For these individuals, the contaminated OG presents an immediate contact hazard which can be negated to a large degree through the use of the M291 or M295 decontamination kit, as long as the kit is utilized within 15 minutes of contamination. These contaminated OG's must be removed as soon as possible but absolutely within 24 hours. This suit replacement will take place at the CCA/TFA complex.

2.1.3. CCAs can be part of a shelter or they can be established in an open air environment. For the most part, CCA/TFA processing will take place in the open air as opposed to inside NBC filtered facilities. Even inside collective protection facilities, the majority of CCA processing steps will occur in an unfiltered environment and many of the same steps (suit aeration for example) will still apply.

2.1.4. The ultimate goal is to balance mission continuation with force survivability in order to maximize mission effectiveness. Towards this end, the concept of risk assessment (what risk a commander is willing to take in relation to the importance of the mission) is an integral part of the equation.

2.1.5. If not properly set up and operated, many people will be exposed to chemical contamination during the CCA processing operation. In fact, the likelihood of casualties occurring during processing will be directly dependent on:

2.1.5.1. The amount and type of agent used.

2.1.5.2. Personnel processing that are untrained in CCA operations, resulting in a contact transfer of the agent.

2.2. Operational Concepts:

2.2.1. Plan CCAs for assigned collective protection systems and for open air operations.

2.2.2. Designate and train monitors in CCA management and train personnel in CCA use.

2.2.3. Develop procedures and checklists for assistants and signs for processing personnel.

2.2.4. Obtain supplies and equipment for stocking and resupply.

2.2.5. Develop procedures and designate areas for OG aeration, rubber IPE decontamination, weapons decontamination and storage, and trash disposal (discarded contaminated equipment, and waste generated by shelters and CCA operations).

2.2.5.1. Place shelter and CCA supplies and equipment susceptible to contamination under covers. Process supplies and equipment for shelter resupply through the CCA. Replace these covers as necessary based on serviceability, perceived agent penetration capabilities, etc.

2.2.5.2. After a chemical attack it may not be necessary to process the entire base populace. This decision will be determined by the agent's expected persistency time. See **A2.12.** for determining CCA processing line configurations.

2.2.5.3. Decontaminate IPE as soon as practical (approximately 15 minutes) after contamination occurs.

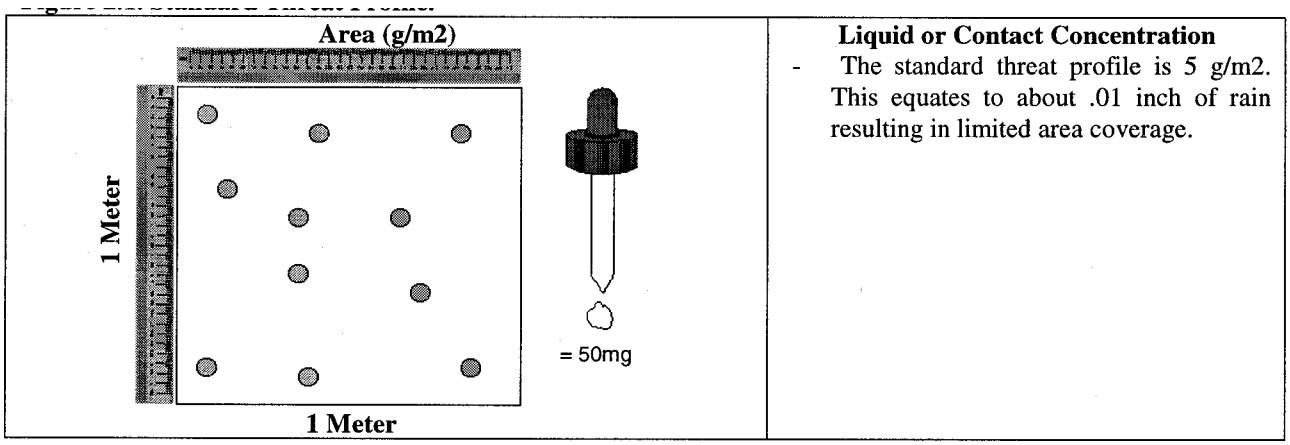
2.2.5.4. To the longest extent possible and with the authorization of the installation commander, try to delay processing personnel exposed to liquid/solid agents to allow decontamination by weathering. A one to two hour delay can reduce contamination levels significantly, thereby reducing the risk of agent transfer.

2.2.5.5. Bag and remove liquid/solid contaminated IPE and waste from the CCA as soon as possible to reduce vapor levels. Also bag and remove trash from shelters. Mark the bags as contaminated waste, OG, human waste, trash, etc. If possible use egressing personnel to take the bags to the designated disposal areas or to the decontamination area.

2.3. Assumptions/Baseline.

2.3.1. Agent Delivery Systems. The primary threat to air bases in regards to chemical-delivery vehicles is bulk-filled missiles. Because of the greater area coverage associated with airburst as opposed to impact fusing, it is assumed the missile will function as designed with airburst fusing. A probable scenario will involve from one to five missiles per base per attack. In most cases, a single missile footprint (optimal functioning) will cover approximately one million square meters - 500 meters wide by two kilometers in length. The contact hazard, with resulting vapor concentrations, will vary within the footprint - with the heaviest concentrations (expectantly, 5 grams per square meter) accounting for less than 10 percent of the total area.

Figure 2.1. Standard Threat Profile.



2.3.1.1. In the event an air base is within approximately 100 kilometers of the enemy's border, it is possible a few aircraft could penetrate air defenses during the first couple days of the conflict and deliver bulk-filled chemical bombs or conduct limited line-spray operations.

2.3.1.2. It is also possible for small teams of ground forces or to use chemical mortars, land mines, or rockets for harassment activities against air bases. Sprays may even be a threat by special operations forces (SOFs).

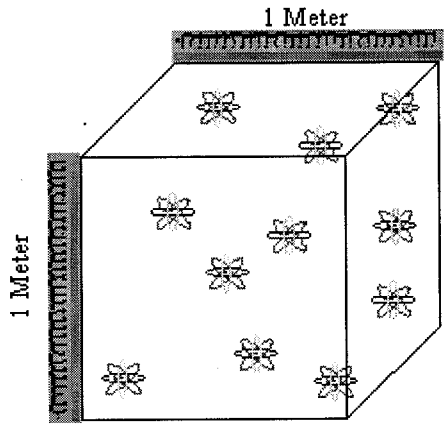
2.3.2. Primary Threat Agents. The primary chemical agents likely to be used against an air base are Distilled Mustard (HD), Sarin (GB), and Soman (GD). Depending on the adversary, Lewisite (L), Cyclosarin (GF), and VX might be utilized. Theoretically, all of these agents can be delivered in neat, thickened, or dusty form. Assumptions are made that:

2.3.2.1. The enemy may deliver a combination of agents during a single attack, i.e., a single attack containing both GD and VX.

2.3.2.2. The expected ground contamination levels would be no more than 5 g/m2.

2.3.2.3. The maximum total exposure from any single attack would be no more than 4500 mg-min/m3.

Figure 2.2. Chemical Volume/Vapor Concentration

Volume (mg/m3)	Vapor Concentration
	- The dose equals the concentration x time (CT). - 5 TBMs are expected to produce no more than 4,500 mg-min/m3. - Minute-by-minute concentrations will vary.

2.3.2.4. In the event biological agents are utilized, either toxins or pathogens, the basic organization and processing principles outlined in this manual will still apply although some additional difficulties exist in the areas of detection and decontamination.

2.3.2.5. Individuals will deploy or be equipped with chemical/biological protective equipment in accordance with AFI 32-4001.

2.3.2.6. The CCA/TFA function directly supports sustainment of mission operations so long as a CB hazard exists. However, leadership must carefully consider the necessity of extended CCA/TFA operations because the people in a CCA/TFA are more vulnerable, (security, less splinter protection, etc.) than at their normal duty location on base. Additionally, span of control becomes strained by the physical separation of personnel from their normal communication modes.

2.4. Sequence of Events. In regards to the establishment of a CCA/TFA, the basic sequence of events following a Weapons of Mass Destruction (WMD) attack on an air base would be:

2.4.1. NBC reconnaissance teams, SMTs, other specialized teams, and base populace initiate NBC monitoring.

2.4.2. NBC Control Center personnel analyze results and advise commander of hazards (type and duration).

2.4.3. NBC reconnaissance teams check pre-selected CCA/TFA sites (on and/or off-base) for contamination and attempt to find “clean” areas. The first-choice will always be to remain on base.

2.4.4. Once the decision has been made to activate the CCA(s), support materials are brought from their protected positions (cover and splinter protection) to the selected site(s).

2.4.5. Under Civil Engineer Readiness/Life Support supervision, augmenters establish the CCA/TFA(s). Both aircrew and ground crew personnel processing lines should be established. Additionally, ensemble aeration areas and contaminated waster disposal areas must be established. Medical patient decon stations will likely be established in the same general area.

2.4.6. The CCA/TFA operations plan is executed (personnel rotation to and from the complex, transportation, logistics, personnel accountability, security, etc.).

2.4.7. Transportation from contaminated pick up locations to the CCA drop off points are established, routed, and coordinated.

2.4.8. Logistics personnel initiate resupply actions for the CCA/TFAs.

2.4.9. Personnel accountability systems are activated, and site security measures are taken to protect the site personnel and resources.

2.4.10. TFA "enhancements" (eating facilities, work center operations, etc.) are initiated IAW commander directives.

2.4.11. The CCA/TFA remains operational for the duration of the hazard or until it can no longer be sustained operationally or logistically.

2.4.12. Relocation plans are initiated. Personnel and equipment are processed for relocation and when complete, the CCA/TFA is closed.

2.5. Site Components. Each CCA must have an entrance, Contact Hazard Area (CHA), Vapor Hazard Area (VHA), and an airlock/transition point between the VHA and Toxic Free Area (TFA). The CCA/TFA complex is composed of the following sub-elements, each connected in some way and can only be successfully accomplished through cohesive, integrated operations. See **Figure 2.3.** and **Figure 2.4.** for an example layout of the CCA site components

2.5.1. Transportation drop-off point. In relation to the prevailing winds, the drop-off point should be located on the downwind side of the CCA (approximately 30-meters). At this point, establish a wind device, ie, wind sock, to monitor CCA wind direction. It is in this area that the first active efforts are taken for individuals to reduce both the contact and vapor hazards. As personnel leave the transportation drop-off point, they should be directed (either by sign or attendant) to the contamination control area.

2.5.2. CCA Entrance. The entrance to the CCA includes the following areas: Arrival and Initial Decontamination Area, Weapons Clearing, Wash & Holding Area, and the External Equipment Removal Area.

Use this area to:

2.5.2.1. Perform initial decontamination of yourself and your buddy prior to entering the Contact Hazard Area. See **Table A2.9.** for CCA processing procedures.

2.5.2.2. Inform the processees of the sequence of events they will experience and any emergency response procedures.

2.5.2.3. Provide a covered area for rest and shade while waiting to process.

2.5.2.4. Allow for turn in of weapons and the removal of external equipment worn other than the overgarment. i.e. Helmet, Vest (aircrew), Web Gear, Mask Carrier, Flak Vest, and Cold/Wet Weather Gear. Most of this equipment cannot be decontaminated to safe levels due to material composition. Equipment will be marked with individual's rank, name, and duty position for reissue to the same individual.

2.5.3. Contact Hazard Area (CHA). CCA processing stations in which the individual removes their OG. The goals of the CHA are contamination reduction in regards to processing personnel and the containment of all contact hazards i.e., agents in liquid or solid form, within the CHA.

2.5.4. OG Aeration Area. Units must perform a risk assessment before establishing an OG aeration area. This area may not be necessary if the chemical threat is low, the unit is sufficiently stocked with suits, and the resupply line functions. In this case, previously-used suits could be sent directly to the contaminated waste disposal area. However, if the threat of multiple chemical attacks is probable, suits are in short supply, or there isn't a realistic resupply capability, then an aeration area is critical to mission sustainment. Personnel should consider the following items when selecting a site.

2.5.4.1. Accessibility of site in relation to the CHA: Locate the aeration area as close to the CHA as feasible. However, you must ensure the aeration area is downwind from the CHA/VHA transition point. Also, ensure the aeration area is far enough from the TFA and mask removal point that it doesn't present a threat to unprotected personnel. The aeration area's self-generated vapor hazard must be constantly monitored because this collection of contaminated suits in a single area will create an artificial "hot spot".

2.5.4.2. Access to the suits for egress.

2.5.4.3. Terrain. In order to optimize the effects of weathering, the suits should be exposed to high temperatures, sunlight, and high winds. However, the suits should be provided some overhead cover in order to prevent inadvertent recontamination.

2.5.4.4. Security. Security for this area will come from available resources.

2.5.5. Contaminated Waste Disposal Area. Consider the following suggestions.

2.5.5.1. Method of containment or disposal. The three primary ways of handling the problem would be open storage, burying, and/or burning.

2.5.5.2. Location(s). It's probable that at least two sites will be required, one within the main base area and one located somewhere in conjunction with the CCA function. Site selection should be based on prevailing winds for the season and be located downwind of all personnel housing and rest and relief locations, even in regards to the main base area.

2.5.5.3. Marking and personal protection requirements.

2.5.5.4. Monitoring. If sufficient equipment exists, place automatic vapor alarms around, or just downwind of, the area. NBC reconnaissance personnel should also periodically monitor just outside the area with hand-held vapor detection devices such as the chemical agent monitor (CAM) or the M256.

2.5.6. Vapor Hazard Area (VHA). The VHA provides the last chance for the CCA staff to verify processing personnel are free of any type of contamination before the individual(s) transition to the TFA. In the case of open-air processing there should be at least a 15-meter buffer zone between the end of the CHA and the monitoring station. At the end of the VHA, attendants should verify the chemical vapor concentrations are at safe levels before they let people remove their mask. A decision to remove mask will be based on the recommended safe levels provided in **Attachment 2**. Consequently, the two-stage approach of clothing removal and monitoring is executed throughout this area.

2.5.6.1. Personnel must remove all clothing that could be "off gassing" in the VHA prior to entering the TFA. Personnel should not be allowed to automatically transition straight into the TFA

with their underwear if the people were using the no Battle Dress Uniform (BDU) option since that layer of protection would be missing. Consequently, each installation must develop a workable concept of operations for clothing replacement.

2.5.6.2. If the threat dictates, personnel should be monitored with the CAM for "dusty" contamination within the VHA. The attendants sense of sight and use of M8/M9 paper are not effective, especially in the case of dusty mustard (DHD).

2.5.6.3. In order to provide the highest degree of protection for personnel, VHA attendants must routinely monitor the air at the mask removal point.

2.5.7. Mission Critical Equipment (MCE) Refurbishment Area. The purpose of the refurbishment area is to decontaminate MCE and return it to the warfighter as quickly as possible. This area includes refurbishment of groundcrew, firefighter and EOD equipment. Refer to **Table A2.13.** for MCE refurbishment procedures. To prevent bottlenecks during this process, this function should have dedicated personnel when the CCA is fully operational. Regardless of whether it is a single activity or several line-by-line activities, the people will require large supplies of plastic bags, M8 paper, M291/M295 decontamination kits, sponges and bleach. The refurbishment area should be located outside the CCA processing lines. See **Figure 2.3.** for an example of the Refurbishment Area location and **Figure A2.1.** for the Refurbishment Station layout. The refurbishment duties are split between the Contact Hazard Area and the Vapor Hazard Area. Ensure adequate space, dedicated personnel, and supplies are available for this tasking.

2.5.7.1. People in the TFA will remain vulnerable to any new chemical attack, radical wind shift, etc. until their mask is returned.

2.5.7.2. Untrained personnel may inadvertently be the cause of casualties. Extreme attention to detail is required in regards to contamination identification, mask decontamination if appropriate, cleaning of the mask, filter replacement, etc. The eyes are the most vulnerable part of the body and the slightest mistake on the part of the mask refurbishment team may well result in vision problems down the line, with the corresponding immediate loss of productivity.

2.5.8. Transition Buffer Zone Between CCA and TFA. This is the area where personnel remove their mask prior to entering the TFA.

2.5.9. Toxic Free Area to include accountability and logistics resupply point(s).

2.5.10. Egress Portion of CCA.

2.5.11. Supply Transition Point.

2.6. Site Selection. The most important step in selecting a suitable location for the installation CCA/TFA complex(s) sterns from a comprehensive vulnerability assessment. See **Figure 2.5.** for an example of where to establish the CCA in relation to the chemical deposition. The next consideration is knowing how large of an area will be needed. There are two main directions an installation may take.

2.6.1. Off-base. The decision to site CCA/TFA complex off the installation (probably at pre-selected sites located at least 10 km from the air base) should work if the following "ideal" parameters are present.

2.6.1.1. Installation is located at least 15 km away from populated areas and the proposed route(s) to the CCA/TFA complex are not intersected by potential civilian evacuation routes.

2.6.1.2. Off-site locations are readily available which provide adequate space, multiple access routes, sufficient water and utility support, communications (primarily back to the main installation's command and control and warning and notification networks), and a degree of personnel protection (from elements and hostile attack).

2.6.1.3. Civilian populations are not located downwind within 15 km of the CCA complex, to include the aeration area and contaminated waste disposal area.

2.6.1.4. There is an exceptionally limited or nonexistent ground threat, to include harassment activities from state-directed terrorists or sympathizers.

2.6.1.5. The installation possesses sufficient resources to execute the plan.

2.6.2. On-base. Finding and utilizing clean areas within the installation's perimeter as the location for CCA/TFA operations is preferable when:

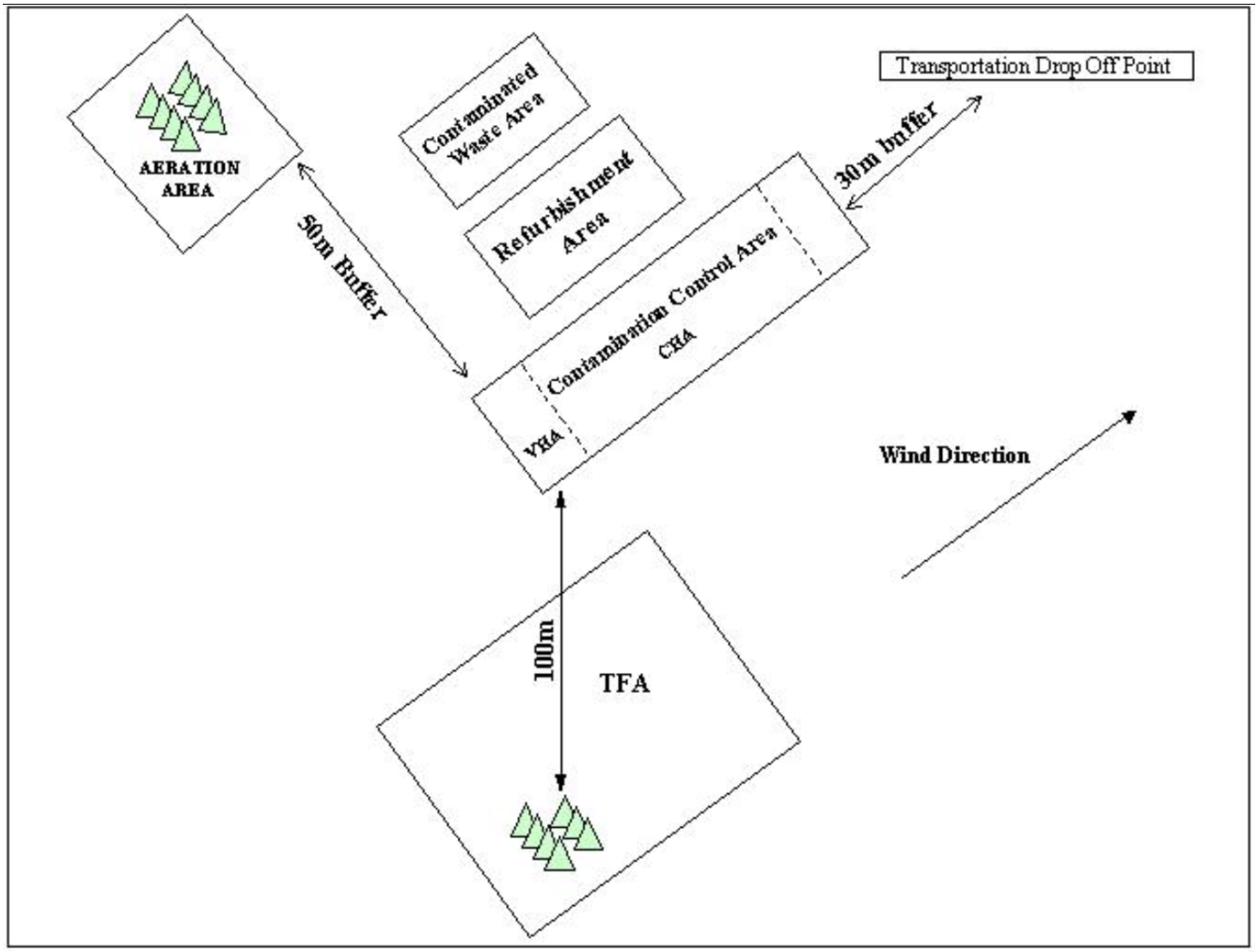
2.6.2.1. The air base is near heavily populated civilian areas or near a potential civilian evacuation route. The resulting traffic jams caused by massive amounts of people, some of whom will be overtaken by the agent effects with disastrous driving effects, will probably result in making off-base CCA/TFA complexes unreachable.

2.6.2.2. A disruptive ground threat exists.

2.6.2.3. The population is resource constrained in regards to transportation. Communications limitations are also a factor.

2.6.2.4. The installation is large enough to possess areas outside of the "target rich environment" associated with the industrial and main housing areas.

Figure 2.3. Example of a Site Components Layout.

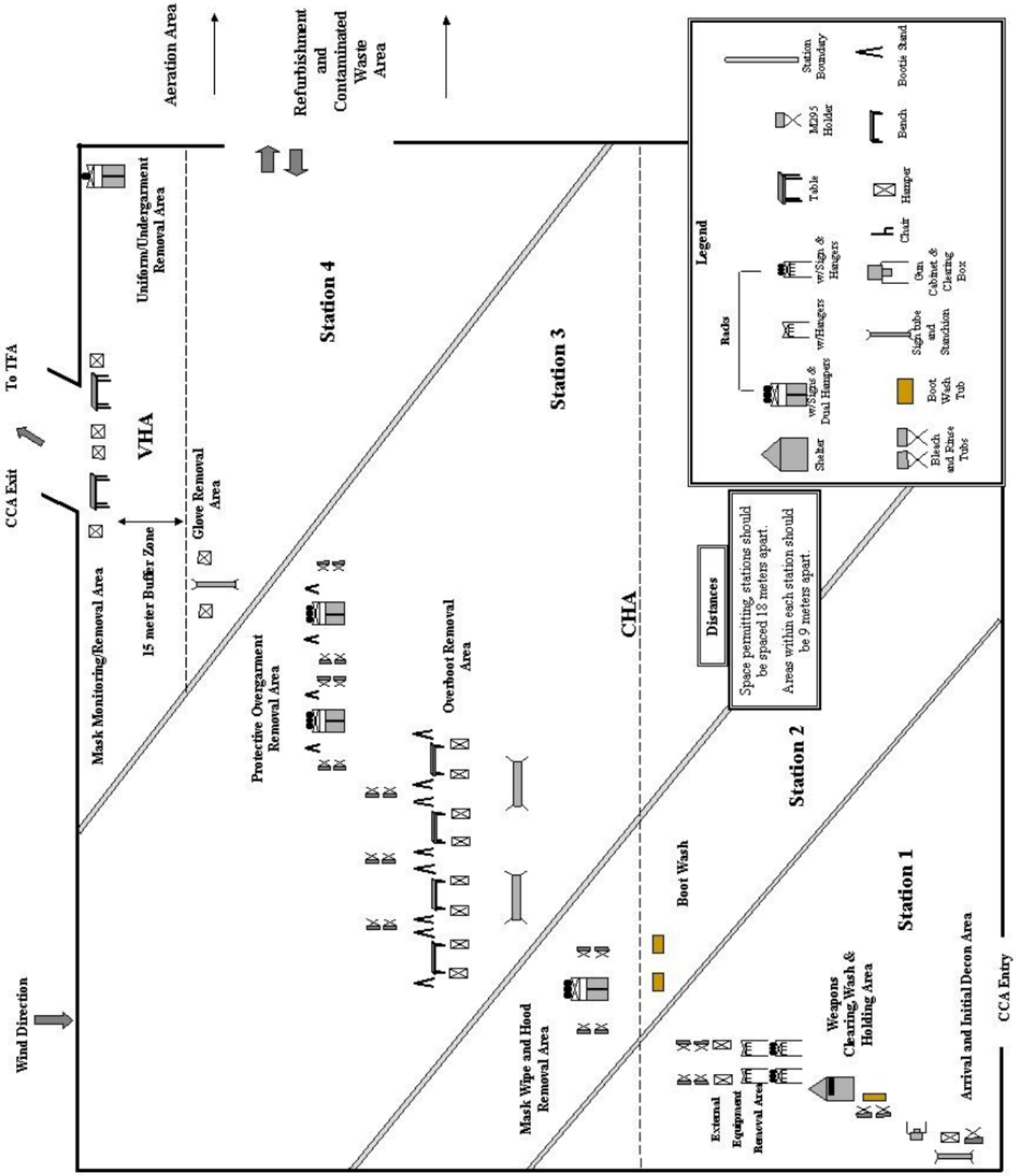


2.6.2.5. The installation possesses a reliable detection network. The potential risk to personnel, as a result of changing weather conditions, certain terrain features, etc. is increased if the installation can't field an effective detection system. For example, installation may have relatively clean areas above the chemical cloud. Vapor interaction with air currents is aided by the fact the threat agents are heavier than air by factors ranging from 4.8 to 9.2. This generally means the agents tend to follow the low-lying areas of the ground. If an installation has uncontaminated hill tops, ridges, or multi-storied buildings, it's possible the concentrations of agent at these levels (verified through the use of detectors) are such that rest and relief may be obtained by "going up".

2.6.3. A combined approach of site selection may be the best methodology. The prioritization for site selection should be: on-base (ground-level arrangement), on-base (vertical arrangement - space permitting), and off-base.

2.6.4. The requirement for space is a factor associated with selecting the site for a CCA/TFA complex. This factor depends on several variables. As a point of departure, consider a site of 500-meters square.

Figure 2.4. Example of a Contamination Control Area Layout.



2.6.4.1. The first variable is the processing requirement. Once a processing line is established and people are moving through it (i.e., as one person leaves a station another person steps up), a relatively smooth flow will begin to take place.

2.6.4.2. Each of the CCA/TFA complex sub components has an accompanying space requirement: CCA entrance, CCA processing lines, mask refurbishment area, the ground crew ensemble (GCE) aeration and contaminated waste disposal area, buffer or transition area, egress areas, supply transition point, and the TFA.

2.6.4.2.1. CCA entrance. A single entrance area can be used for multiple processing lines. However, the size of the entrance area will depend on the number of personnel the installation is expecting to process at any given time. This number will drive the size of the transportation point (one bus at a time or multiple), the size of the contamination control area, and the size of the “holding” area where people can rest while awaiting their turn to process.

2.6.4.2.2. The CCA processing lines will take a large amount of space in order to optimize processing and force protection ideals. Spread the lines out (distance between processing stations) as far as reasonably possible. If space permits stations should be spaced approximately 18 meters apart and areas within each station should be 9 meters apart.

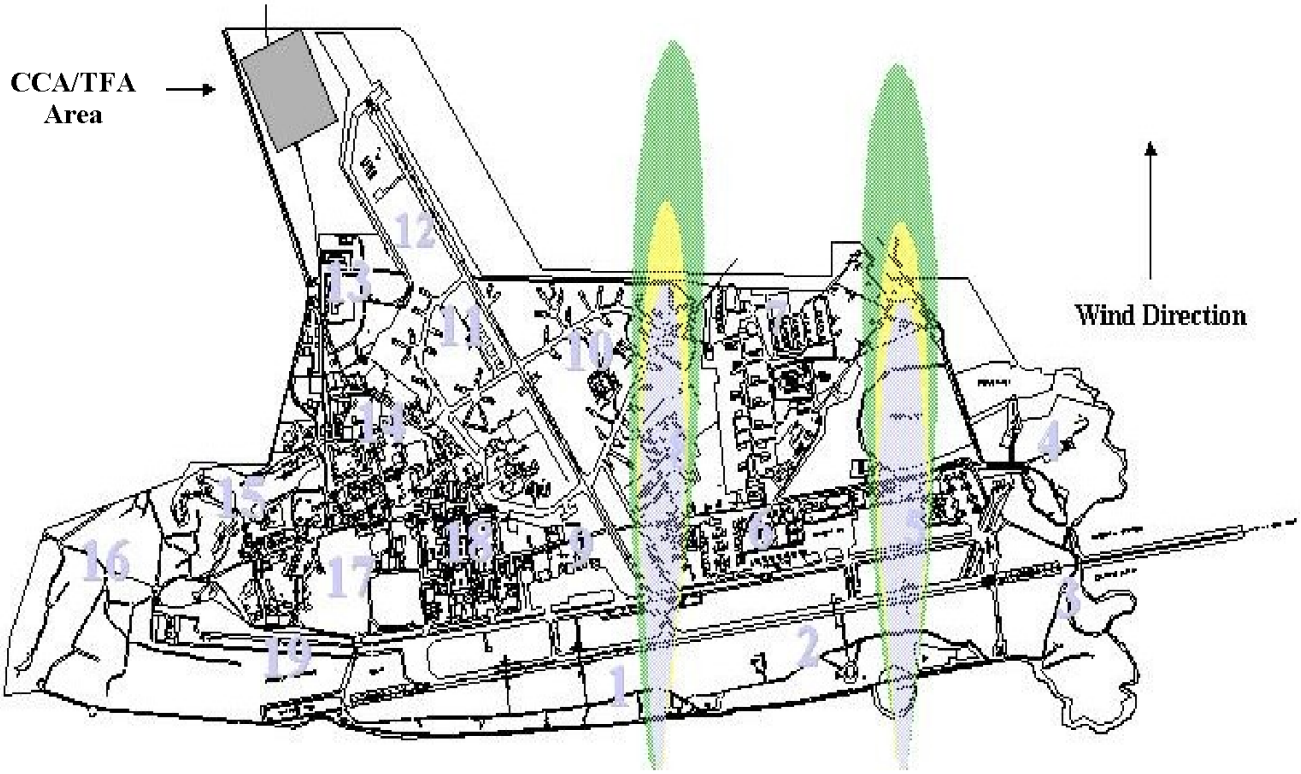
Establish the lines in an angular and staggered fashion as opposed to a straight-line concept. The angle of the line should be a 20-degree angular configuration. Using this method, the concentration of "trailingî vapor hazards washing over people downwind of each processing station will be significantly reduced. See **Figure 2.4.** for the example of a CCA Layout.

2.6.4.2.3. Lay out processing lines with plenty of space for the mask refurbishment area located in the CHA. The mask refurbishment work stations will require sufficient space for working, a disposal area for detection and decon kits/hoods/eyelens outserts, etc., a stock of spare parts, and a holding area for masks waiting to be checked.

2.6.4.2.4. The GCE aeration area and the contaminated waste disposal area. The aeration area has the potential to be as large or larger than the processing lines themselves. If a base population of 2000 use its full complements of OGs because of successive attacks, there would potentially be 6000 suits weathering at the same time. Therefore, an area of approximately 200-meters square is recommended. This area should be separated from the CCA lines and the TFA by approximately 50 meters.

2.6.4.2.5. Once monitored personnel remove their mask and proceed to the TFA. The further the better, but at least 25 meters is recommended from the end of the VHA to the TFA. See **Figure 2.4.**

Figure 2.5. CCA Site Selection



2.6.4.2.6. There is also a requirement for the installation to operate egress-processing lines. Adequate space must be provided for sufficient egress lines to allow personnel to process out of the TFA, keeping with shift change requirements. CCAs should accommodate simultaneous ingress and egress and inhibit cross-contamination of egressing personnel. In a worst case scenario, many lines may be necessary because people would have to utilize previously used OGs, combat boots, and clothing. In this scenario, space would also have to exist to store these previously-used items along the egress processing line(s). There is also a space requirement for storage space for individual equipment items such as web belts, canteens, first aid kits, helmets, M9 paper, etc.

2.6.4.2.7. Supply Transition Point. The size of this area will depend on the wing's CCA implementation philosophy and the degree of contamination control utilized prior to the attack.

2.6.4.2.8. TFA. The size of the TFA is the largest variable of all. An area of 200-meters square is recommended. The main housing portion of the TFA should be separated from the CCA processing lines by the maximum distance available. A separation of at least 100-meters is recommended. A chemical vapor detection network should exist between the TFA and the CCA.

2.6.4.3. Other factors that should be considered during the site selection process are site security, communications, slope of the terrain, and the presence of other natural features.

2.6.5. CCA/TFA Patient Decontamination Site: Optimal requirements for a decontamination facility site include:

2.6.5.1. Co-location with the supported Medical Treatment Facility (MTF) (not closer than 75 meters downwind or crosswind, and situated so arriving vehicles/casualties can reach it without approaching the MTF).

2.6.5.2. Access to water (free of NBC contaminants but not necessarily potable).

2.6.5.3. Hook-up to electricity/electric generator for water pump operation and lighting.

2.6.5.4. Approximately 60 meters controlled perimeter, and ground/floor gradient sufficient to facilitate drainage of contaminated water away from the decontamination facility and MTF.

2.6.5.5. Protection of equipment from temperature extremes, rain, and pilferage is required.

2.7. CCA Resources. Instructional signs, decontaminants, containers, and other equipment and supplies used in a CCA vary according to the design, processing rates, and availability or preference. General requirements are:

2.7.1. Decontaminants. Liquid solution (5% chlorine solution) is preferred for most areas within the CCA. Normal household bleach is made at the 5% chlorine level. Do not use a 5% chlorine solution to decontaminate skin. Chlorine must be reduced to 0.5% for skin decontamination and must not be placed in open wounds. Standard decontamination kits (M291and M295) will also be used as appropriate for the task. The liquid chlorine mixture is placed in shuffle boxes for footwear decontamination and in troughs for glove decontamination steps. The amount needed for sustainment is based upon a number of variables, such as the type of protective ensemble the individual is wearing, number of personnel processing and flowrate. The CCA attendants will ensure the shuffle boxes and hand troughs are initially filled and checked periodically for refilling as necessary. For planning purposes; the initial CCA start-up quantity using the groundcrew version CAPS is 73 gallons of bleach at 5% concentration and 46 gallons of water. See **Figure 2.4.** for CCA layout. The consumption rate to support 400 personnel is calculated at approximately 60 gallons of bleach (5% percent concentration) for BDO processing and 144 gallons for CPO processing; an average of 12 gallon of water was used for both processes. Consider contacting Civil Engineering Utilities personnel to create the 5% solutions required in order to reduce contract costs and airlift/storage requirements. Caution: shuffle pits become extremely slippery when filled with chlorine bleach. Look for solutions to the problem in advance such as laying terry cloth towels in the bottom of the pit to increase friction between overboots and the shuffle pit.

2.7.2. Containers. Use containers to collect contaminated waste and IPE doffed in the CCA. Provide containers at each station. Use plastic bag liners for containers holding contaminated IPE. Liners are recommended for all containers to help remove and store or dispose of their contents. Sealing plastic bags containing contaminated IPE will significantly reduce vapor levels. The amount of containers and plastic bags needed depends on the CCA design (available space) and the processing rate.

2.7.3. Mask Servicing. Spare hoods, mask parts, sponges, brushes, decontaminants, and water are needed to prepare mission masks for reuse. Amounts depend on the CCA processing rate.

2.8. CCA Duties and Staffing. The local commander should determine the personnel needed for each shift since it depends on the CCA size, design, and processing rate. Dedicated CCA monitors may not be feasible for temporary shelters due to the small number of personnel sheltered. The shelter or CCA supervisor designates untrained CCA assistants from the shelterees as required. Unit commanders should des-

ignate personnel as "organizational trainers" to receive CCA management training. CCA training is categorized under the SMT course. CCA duties include:

2.8.1. CCA Supervisor. The CCA supervisor is a designated, trained person responsible for CCA management. At least one per shift is needed for CCA supervision. One per shift for both the CHA and VHA may be needed when the CCA design (including number of lines) precludes supervising all areas or when the processing rate exceeds an effective span of control.

2.8.2. CCA Assistants. CCA assistants are shelterees selected to help operate the CCA as an additional duty when not performing mission essential duties. They perform assigned CCA support tasks for the CCA supervisor. At fixed sites locations the attendants can be identified through the installation READY program and deployed forces.

2.8.2.1. CCA Entrance. Provide an assistant in the holding area who can answer questions concerning the CCA/TFA, collect classified material and direct people to the appropriate processing line, thereby minimizing bottlenecks. Also provide an individual for weapons clearing/storage operations.

2.8.2.1.1. Four people to operate and handle suit transport to and from the aeration area.

2.8.2.1.2. One person to control the contaminated waste disposal area (equipment operator preferably).

2.8.2.1.3. One person per processing line for hood roll.

2.8.2.1.4. One person per two or three processing lines to assist personnel as necessary prior to their reaching the VHA.

2.8.2.2. CHA Staffing. Minimum staffing, per shift, should be:

NOTE: The minimum staffing requirements listed below are based upon the complete setup of the CCA layout in **Figure 2.4.** Manning may fluctuate based upon the setup.

2.8.2.2.1. Four people to operate and handle suit transport to and from the aeration area.

2.8.2.2.2. One person to transport contaminated waste to the disposal area. (equipment operator preferably).

2.8.2.2.3. One person per processing line at the Mask Wipe and Hood Removal Area.

2.8.2.2.4. One person per two or three processing lines to assist personnel as necessary prior to their reaching the VHA.

2.8.2.3. VHA Staffing. Minimum staffing, per shift, should be:

2.8.2.3.1. Two to three personnel are necessary to monitor personnel at the BDU removal point for potential contamination. These personnel could also be utilized to monitor the air at the mask removal point.

2.8.2.3.2. Two people to operate and handle clothing transport to and from the aeration area.

2.8.2.3.3. Four personnel are necessary for mask refurbishment operations. See **A2.8.** for MCE refurbishment procedures.

2.9. Miscellaneous Support Issues.

2.9.1. Transportation. In practical terms, we do not have the ability to thoroughly decontaminate vehicles to the point they could roll into the TFA. There is no need to attempt decontamination of the vehicles in regard to troop transport to and from the pick-up/drop-off points throughout the installation.

2.9.2. Logistics supply. There will be a need to establish a supply transition point. This supply transition point may be adjacent but must stay downwind of the CHA/VHA transition lines associated with personnel processing. Nothing can be allowed through the supply transition area until it has been thoroughly monitored and declared to be free of all contamination, to include low-level vapors. This effort will require staffing by personnel trained in basic contamination control techniques and advanced use of chemical detection instruments such as the CAM.

2.9.3. Command, Control, Communications and Intelligence (C^3I). C^3I must be closely linked in order for the operation to be a success.

2.9.3.1. Reliable, redundant communications must exist internal to the CCA itself, between the CCA and the TFA, and internal to the TFA. Further, a dedicated communications link must exist between the CCA/TFA complex and the main portion of the installation.

2.9.3.2. Early warning concerning potential hazards to the personnel in the TFA and to the people processing into or out of the CCA is of the utmost importance.

Chapter 3

MISSION-ORIENTED PROTECTIVE POSTURES (MOPP)

3.1. General Information.

3.1.1. AFVA 32-4012, *Mission-Oriented Protective Postures*, depicts the various MOPP levels. See **A4.1.** for MOPP level configurations.

3.1.2. MOPP only applies if there is a threat of CB agent use. **Attachment 4** contains guidance on MOPP levels and variations. **Attachment 5** contains MOPP Analysis and MOPP Analysis examples.

3.1.3. People may need to relieve themselves while in a chemical-biological contaminated environment while wearing the groundcrew ensemble. See **Attachment 6** for procedural guidance.

3.1.4. See **Attachment 7** for chemical-biological warfare defense (CBWD) cold weather operations.

3.1.5. Water hydration is critical for personnel wearing the OG. Personnel usually have a tendency to drink to satisfy thirst rather than physical needs, consequently the concept of "forced" hydration, drinking more than to satisfy thirst, may need to be implemented. See **Attachment 9** for guidance on water consumption at various temperatures.

3.1.6. While in MOPP 3 and 4, the time needed to complete tasks will increase. **Attachment 9** contains guidance to determine estimated work completion rates.

3.2. Installation Commander. The installation commander should:

3.2.1. Direct MOPP levels and variations, based on mission, local situation (SRC input), intelligence data, and higher headquarters requirements.

3.2.2. Commanders must adopt a risk assessment philosophy when balancing force survivability and mission continuation requirements.

3.3. Unit Commander. The unit commander should:

3.3.1. Implement procedures to control heat build-up through work and rest cycles and maintaining hydration standards. **Attachment 9** contains additional guidance on work and rest cycles and estimated rest times.

3.3.2. If available, consider using the multi-man intermittent cooling systems to alleviate heat build-up during physically demanding operations and in hot climates. T.O. 35EA4-7-6-1, *Multi-Man Intermittent Cooling System*, contains additional guidance.

3.4. Medical Services. Should advise the installation commander on hydration standards and work and rest cycles for personnel in MOPP 3 and 4 according to **Attachment 8** and **Attachment 9**.

3.5. Survival Recovery Center (SRC) Staff. SRC representatives should assist the installation commander and subordinate commanders with MOPP analysis by providing functional knowledge, expertise, and advice.

3.6. Individuals. Individuals should:

3.6.1. Be proficient in the implementation of directed MOPP levels.

3.6.2. Be proficient in the implementation of authorized MOPP variations.

3.6.3. Be knowledgeable and understand the importance of hydration standards and work rest cycles.

Chapter 4

ATTACK ACTIONS

4.1. Individual Protective Equipment (IPE) Requirements. AFI 32-4001, Chapter 3 contains guidance for protective equipment worn during chemical, biological, and conventional attack.

4.2. Detection and Identification Planning Factors.

4.2.1. Chemical and Biological. The installation commander should:

4.2.1.1. Plan to deploy and integrate automatic detection, identification, and warning systems with individual detection and identification equipment. Ensure maximum coverage of critical areas with automatic systems and rely on manual systems to expand or back-up the coverage.

4.2.1.2. Using the data provided by the fielded detectors and with the help of the SRC staff, determine the status of the airfield. The actual presence or absence of contamination should be confirmed by multiple detection systems or kits. The following indicators should help to determine the presence or absence of contamination:

4.2.1.2.1. Agent symptoms in people and wildlife. Some chemical agents may not manifest themselves until several hours after an attack. Some biological agents may not manifest themselves until several days or weeks after an attack.

4.2.1.2.2. Tactics and weapon systems used in the attack.

4.2.1.2.3. Presence of suspicious clouds, vapors, powders, or liquids.

4.2.1.2.4. Intelligence data supporting the likely or actual use of CB agents in theater.

4.2.1.2.5. Reports from personnel, teams, and automatic systems.

4.2.1.3. Use NBC reconnaissance teams, damage assessment and response teams (DARTs), contamination control teams (CCTs), and SMTs to verify initial positive indications, identify agents, and survey unmonitored areas as required.

4.2.2. Nuclear. Rapid detection of fallout arrival and measurement of radiation intensity are needed to continue mission operations, warn personnel, tailor protective measures to the situation, and for reporting. SMTs can provide much of the information. NBC reconnaissance teams, DARTs, and CCTs may be available for collecting information on previously unmonitored areas that obtain operational significance.

4.3. Selective Unmasking. The installation commander can use selective unmasking procedures outlined in **Attachment 10** to validate the absence of chemical agents. The utility of using these procedures is primarily based on detector capabilities in relation to the threat agents and the symptomology of the threat agents. Selective unmasking should be implemented only as a last resort to verify the absence of chemical agents.

4.4. Contamination Control. See **Attachment 11** for guidance on contamination control.

4.5. Pre-, Trans-, and Post-attack Actions. See **Attachment 12** for planning factors for pre-, trans-, and post-attack actions.

4.6. Depleted Uranium . See **Attachment 13** for issues concerning depleted uranium.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFPD 32-40, *Disaster Preparedness*

AFI 32-4001, *Disaster Preparedness Planning and Operations*

AFI 25-101, *War Reserve Materiel (WRM) Program Guidance and Procedures*

AFMAN 32-4017, *Civil Engineer Readiness Technician's Manual for Nuclear, Biological, and Chemical Defense*

AFMAN 37-139, *Records Disposition Schedule*

AFM 11-303, *Life Support Combat Operations*

AFVA 32-4012, *Mission-Oriented Protective Postures*

NORAD Instruction 10-22, *NBC Warning and Reporting System*

Contamination Control Area Phase 2 - Sustainment Exercise Operational Support Study

Contamination Control Area Phase III Air Force Specialty- Specific Processing

Abbreviations and Acronyms

AFR—Air Force Reserve

AFVA—Air Force Visual Aid

ALAD—Automatic Liquid Agent Detector

ANG—Air National Guard

AOR—Area of Responsibility

ARC—Air Reserve Component (AFR and ANG personnel combined)

BCE—Base Civil Engineer

BDO—Battle Dress Overgarment

BDU—Battledress Uniform

C3 or C—3 Command, Control, and Communications

CAM—Chemical Agent Monitor

CB—Chemical-Biological

CBW—Chemical-Biological Warfare

CBWD—Chemical-Biological Warfare Defense

CCA—Contamination Control Area

CCT—Contamination Control Team

CHA—Contact Hazard Area

CMBCC—Consolidated Mobility Bag Control Center

ColPro—Collective Protection

CPO—Chemical Protection Overgarment

DART—Damage Assessment and Response Team

FM—Field Manual

GCE—Ground Crew Ensemble

IPE—Individual Protective Equipment

JFIRE—Joint Fire Fighter Integrated Response Ensemble

JSLIST—Joint Service Lightweight Integrated Suit Technology

LDA—Lightweight Decontamination Apparatus

MCE—Mission Critical Equipment

MOPP—Mission Oriented Protective Posture

MTW—Major Theater War

MTF—Medical Treatment Facility

NBC—Nuclear, Biological, and Chemical

NBCC—Nuclear, Biological, Chemical, Conventional

OG—Overgarment

RADIAC—Radiation Detection, Indication, and Computation

SCPS—Survivable Collective Protection System

SCUD—NATO designation for Soviet designed short-range ballistic missile

SMT—Shelter Management Teams

SOF—Special Operations Force

SRC—Survival Recovery Center

TBM—Tactical Ballistic Missile

TFA—Toxic Free Area

UAV—Unmanned Aerial Vehicle

UCC—Unit Control Center

UXO—Unexploded Ordnance

VHA—Vapor Hazard Area

WBGT—Wet Bulb Globe Temperature

WMD—Weapons Of Mass Destruction

WMDT—Wartime Medical Decontamination Team

WRM—War Reserve Material

Terms

Airlock—The controlled space that allows people or equipment to pass between the vapor hazard area (VHA) and the toxic free area (TFA), without disrupting the TFA protective integrity.

Assistants—Untrained personnel that help the shelter management team carry out assigned duties.

Avoidance—Actions to prevent contamination from getting on mission-essential resources and personnel, whether directly from agent deposition or by transfer from contaminated surfaces.

Battle Dress Overgarment(BDO)— Specific reference to the camouflage (woodland green or desert pattern) OG coat and trousers only.

Biological Agent—A microorganism that causes disease in personnel, plants, or animals or causes the deterioration of materiel.

Biological Defense —The methods, plans, and procedures involved in establishing and executing defensive measures against attacks using biological agents.

Bunkers and Revetments—Protective structures used to protect resources from the effects of conventional weapons.

Chemical Agent—A chemical substance which is intended for use in military operations to kill, seriously injure, or incapacitate personnel through its physiological effects. The term excludes riot control agents, herbicides, smoke, and flame.

Chemical Defense—The methods, plans, and procedures involved in establishing and executing defensive measures against attack utilizing chemical agents.

Chemical Monitoring—The continued or periodic process of determining whether or not a chemical agent is present.

Chemical Warfare (CW)—All aspects of military operations involving the employment of lethal and incapacitating munitions/agents and the warning and protective measures associated with such offensive operations. Since riot control agents and herbicides are not considered to be chemical warfare agents, those two items will be referred to separately or under the broader term "chemical." The term "chemical warfare weapons" may be used when it is desired to reflect both lethal and incapacitating munitions/ agents of either chemical or biological origin.

Collective Protection (ColPro)—systems protect those inside a building, room, shelter or tent against contamination through the combination of impermeable structural materials, air filtration equipment, air locks, and overpressurization.

Contact Hazard Area (CHA)—An area in a CCA where chemical-biological agents in both liquid/solid and vapor form may exist.

Contamination—(1) The deposit, absorption, or adsorption of radioactive material, or of biological or chemical agents on or by structures, areas, personnel, or objects. (2) Food and/or water made unfit for consumption by humans or animals because of the presence of environmental chemicals, radioactive elements, bacteria, or organisms, the byproduct of the growth of bacteria or organisms, the decomposing material (to include the food substance itself), or waste in the food or water.

Contamination Control—procedures to avoid, reduce, remove, or render harmless, temporarily or permanently, nuclear, biological, and chemical contamination for the purpose of maintaining or enhancing the efficient conduct of military operations.

Contamination Control Area—An area in which chemically contaminated individual protective equipment (IPE) is removed; people, equipment, and supplies are decontaminated to allow processing between a toxic environment and a toxic free area; and people exiting a toxic free area may safely don IPE.

Control Center—A unit command and control function. Control centers monitor unit resources and mission capability and coordinate unit activities during disaster operations.

Conventional Weapon—A weapon which is neither nuclear, biological, nor chemical.

Decontamination—The process of making any person, object or area safe by absorbing, destroying, neutralizing, making harmless, or removing chemical or biological agents or by removing radioactive material clinging to or around it. As a part of the contamination control process, decontamination operations are intended to help sustain or enhance conduct of military operations by preventing or minimizing performance degradation, casualties, or loss of material. See definitions of immediate, operational, thorough and reconstitution decontamination.

Emergency Operations Shelters—Shelters that house control centers and other work centers that must remain operational during any phase of hostilities.

Force Protection—Security program designed to protect service members, civilian employees, family members, facilities, and equipment, in all locations and situations, accomplished through planned and integrated application of combating terrorism, physical security, operations security, personal protective services, law enforcement, and supported by intelligence, counterintelligence, and other security programs to ensure combat capability.

Immediate Decontamination—Decontamination that involves:

Aim - minimize casualties, save lives, and limit the spread of contamination

When - conducted as soon as someone suspects critical resources have been contaminated

Who - individual

What - skin, personal clothing, and equipment

Individual Protective Equipment (IPE) —nuclear, biological and chemical warfare, the personal clothing and equipment required to protect an individual from biological and chemical hazards and some nuclear effects.

Joint Fire Fighter Integrated Response Ensemble (JFIRE) —This ensemble includes the Fire Fighter Interspiro protective mask, filters/canister, hood, OG, and chemical fire protective gloves. In addition, fire protective clothing such as the proximity suit and fire boots are worn over the CPO ensemble to provide fire protection capability.

Joint Service Lightweight Integrated Suit Technology (JSLIST) —Chemical Protective Overgarment (CPO) Referred to in this document as CPO. This ensemble includes the MCU-2A/P protective mask, filters/canister, hood, OG, protective gloves with glove inserts, and footwear covers.

Medical Treatment Facility (MTF) —Facility designated to treat wounded, injured or sick personnel.

mg-min/m—3 An expression of the concentration (in milligrams) of an agent in the air breathed in for a specific period (in minutes; usually a 10 minute exposure) contained within a specific volume of air (1 cubic meter).

Neat chemicals—A chemical agent in its original form.

On-Base (ground-level arrangement)—Basic open air CCA set up on base. Stations are spread out horizontally.

On-Base (vertical arrangement)—CCA operation constructed inside a building with stations going up each floor.

Open Air Contamination Control Area—A CCA that is not associated with a collective protective system.

Operational Decontamination—Decontamination that involves:

Aim - minimize contact or transfer hazard and sustain operations.

When - conducted when operations require.

Who - individual, crews, teams, or units.

What - specific parts of operationally essential equipment, material, work areas and exchange of individual protective equipment.

Overgarment (OG)—A generic term used to reference the CPO or BDO.

Peak On-Base Population—The maximum number of military and emergency essential civilians who are planned to be on base. For wartime planning; include additive forces and mobilization augmentees; exclude those host and tenant personnel tasked for deployment, non-essential contractors, non-essential civilians, and all other people covered by evacuation planning.

Pre-attack Phase—A term used in planning for general war. It is the period from the present until the first enemy weapon impacts.

Post-attack Phase—In NBCC warfare, the period between termination of the final attack and formal political termination of hostilities. In base recovery after attack actions, it is the period after an attack where the installation assesses damage and repairs mission critical facilities.

Protection Factor—The relationship between the amount of nuclear fallout radiation which would be received by a completely unprotected person compared to the amount which would be received by a person in a shelter. Example: A shelter with a protection factor of 40 means that a person inside the shelter would be exposed to a radiation dose rate one-fortieth of which they would be exposed in the same location if unprotected.

Pyrophoric—Spontaneously igniting in air.

Radiological Defense—Defensive measures taken against the radiation hazards resulting from the employment of nuclear and radiological weapons.

Readiness—The ability of U. S. military forces to fight and meet the demands of the national military strategy. Readiness is the synthesis of two distinct but interrelated levels: (a) unit readiness - The ability to provide capabilities required by the combatant commanders to execute their assigned missions. This is derived from the ability of each unit to deliver the outputs for which it was designed. (b) joint readiness-

The combatant commander's ability to integrate and synchronize ready combat and support forces to execute his or her assigned missions.

Reconstitution Decontamination—Decontamination that involves:

Aim - eliminate contamination to restore mission critical resources to a condition which permits unrestricted use, handling, or operation, and release from military control. (Decontaminate to the national standards of the location to which the resources will be sent. If no national standards are available, use US standards.)

When - conducted after hostile actions have terminated, when the commander determines it is in the unit's best interest, or when directed by higher authority.

Who - units or wings with external support.

What - mission critical aircraft, equipment, material, work areas and terrain.

Relocation—Moving mission-essential functions and personnel from high- to low-risk target areas for survival, recovery, and reconstitution.

Rest and Relief Shelters—Any shelter not designated as an emergency operations shelter that an installation uses for rest and relief for personnel.

Shelters—structures that protect personnel from exposure to CB contamination. As a minimum, they provide a physical barrier that keeps a portion of the contamination away from the people inside.

Survival Recovery Center (SRC)—The command and control element that directs and monitors the installation's actions before, during and after a contingency. See AFI 32-4001 for recommended composition and responsibilities for SRC members.

Thorough Decontamination—Decontamination that involves:

Aim - reduce contamination to the lowest possible levels, to permit partial or total removal of IPE and maintain operations with minimum degradation.

When - conducted when operations, manning, and resources permit.

Who - units or wings, with or without external support.

What - personnel, equipment, material, or work areas (may include some terrain beyond the scope of operational decontamination.

Toxic Free Areas—provide personnel the ability to work or obtain rest and relief without wearing IPE.

Vapor Hazard Area (VHA) —An area in a CCA where chemical-biological warfare agent vapor hazards may exist.

Weapons Of Mass Destruction (WMD)—Weapons that cause indiscriminate, widespread destruction. Such weapons include nuclear, biological, and chemical weapons in any form, and associated delivery system. These three types of weapons are also referred to as NBC weapons. In arms control usage includes radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon.

Attachment 2

WARTIME SHELTER PREPARATION AND OPERATION

A2.1. Shelter Organization and Operation. The installation commander exercises normal command and control over forces in shelters to ensure personnel are available to continue the wartime mission. A shelter command structure should reflect the typical unit command structure. The same personnel who perform these functions during peacetime should continue their duties during wartime shelter operations. For example:

A2.1.1. The owning organization commander is the commander for all organizational shelters.

A2.1.2. The owning organization first sergeant is the administrative first sergeant for all organizational shelters.

A2.1.3. The commander's support staff continues to perform necessary administrative functions within the shelter community. The most critical functions are to track personnel location and to provide status reports to the personnel readiness unit or equivalent.

A2.2. Shelter Management Teams. Teams are pre-identified by the unit commander for each shelter and perform the following:

A2.2.1. Operate the shelter.

A2.2.2. Select shelterees to perform shelter operational tasks.

A2.2.3. Control entry, exit, and internal shelteree location.

A2.2.4. Monitor for NBC contamination using prescribed detection equipment and check for symptoms resulting from CB agent exposure.

A2.2.5. Brief personnel egressing the shelter into a contaminated environment on the effects of contamination and exposure limits.

A2.2.6. Perform immediate and the appropriate level of operational decontamination.

A2.2.7. Establish a CCA and TFA within each structure possessing collective protection capabilities. In lieu of collective protection facilities, SMTs may be required to perform shelter management and CCA duties at open-air rest and relief locations. Equipment needed varies depending on shelter type, location, and size of the CCAs and TFAs.

A2.2.8. Establish radiological exposure control procedures for each shelter, if the threat warrants.

A2.3. Detection, Identification, and Warning. A system for detecting, identifying, and warning others on the type and location of contamination is mission critical. Shelters are an integral part of the installation detection, identification, and warning system.

A2.4. Pre-attack Actions. Units should:

A2.4.1. Recall shelter teams and activate shelters. This involves training SMTs and CCA team members, implementing operating directives and checklists, obtaining and checking equipment and supplies, and preparing the shelters for occupancy. Pre-position personal gear, equipment, food, clothing, first aid supplies, and hygiene kits for occupants.

A2.4.2. Improve shelter survivability both inside and out. Internal improvements include boarding and covering windows, doors, and other openings; securing loose articles; placing excess furniture and equipment along inside of external walls; and, when necessary, moving people to the innermost part of the shelter. External improvements include revetting or placing earth berms or sandbags against the shelter to increase protection.

A2.4.3. Recall personnel not performing mission critical tasks to their assigned shelter at the proper readiness stage. Control entry and exit through a central point.

A2.4.4. All SMTs should have the ability to detect, measure, and document gamma radiation intensities and dosages and to detect and identify chemical-biological warfare agents if they are a threat to the installation.

NOTE: Personnel may require off-base relocation if there are insufficient rest and relief shelter spaces. Relocation should be consistent with theater directives, major command requirements, logistics capabilities, security for personnel and resources, and local area capability.

A2.5. Trans-attack Actions. SMTs should:

A2.5.1. Suspend shelter in and out processing and secure doors.

A2.5.2. Instruct personnel to take whatever cover is available. Personnel may use shelter CCAs and other covered areas for blast and shrapnel protection.

A2.5.3. Instruct personnel to don IPE items if required.

A2.5.4. Monitor overpressure and filtration systems for proper operations, when applicable.

A2.6. Post-attack Actions. SMTs should:

A2.6.1. Check for damage, unexploded ordnance, casualties, and determine if contamination is present in or around the outside shelter area. Report findings to the SRC through unit control centers.

A2.6.2. For a nuclear attack:

A2.6.2.1. For nuclear fallout, SMTs should check radiation intensity outside the shelter by using prescribed detection equipment. Report readings and the shelter protection factor through the unit control center to the NBC Control Center/SRC.

A2.6.2.2. Implement radiological exposure control procedures outlined in **Attachment 3**.

A2.6.2.3. Curtail outdoor operations during fallout conditions until radiation decays to a level as determined by the installation commander. Perform only those outside tasks required to continue mission-essential functions.

A2.6.2.4. Radiological decontamination. Initiate decontamination procedures for people, supplies, and equipment entering the shelter. Decontamination methods include brushing, vacuuming, removing clothing and washing. Background radiation levels may preclude monitoring to determine if contamination still exists (as a standard, decontaminate those who arrive at the shelter after fallout has arrived and those who exit and return.) Perform operational outside decontamination only when necessary to reduce dangerous inside radiation exposure levels. This usually involves removing radioactive materials from outside the facility (e.g. hosing off the roof or moving materials away from the building).

A2.6.2.4.1. Radiological decontamination of personnel. It is important that all people, and particularly those directing emergency operations, understand that the total radiation injury from fallout is a composite due to several causes, including contamination of the surrounding areas, contamination of skin areas, and ingestion and inhalation of fallout materials. To keep the total radiation injury low, the effect of each potential source of radiation on the total radiation exposure must be kept in mind, and each contributing element should be kept as low as operationally feasible. Normally, ordinary personnel cleanliness procedures will suffice for personnel decontamination during shelter stay and after the fallout period.

A2.6.2.4.2. All persons entering the shelter after fallout starts should brush or shake their outer clothing before entering the shelter. Persons should brush or shake from the downwind side to keep the contaminated dust from blowing into the shelter. If the weather is damp or rainy, the outer clothing should be removed before entering the shelter.

A2.6.2.4.3. After entering the shelter and as soon as practicable, a person exposed to fallout should wash, brush, or thoroughly wipe the exposed portions of the body, such as the hands, face, and hair. If there are shower facilities or sufficient quantities of water are available, persons should bathe with plenty of water and soap.

A2.6.2.4.4. After washing and putting on clean clothing, the person should go to the clean areas of the shelter.

A2.6.2.4.5. Radiological decontamination of clothing. Thorough decontamination of clothing can be deferred until after the emergency shelter period when supplies of water and equipment are available. Equipment for decontamination of clothing includes brooms, brushes, and vacuum cleaners (if available). For more effective decontamination of clothing, washer and dryer equipment should be available.

A2.6.2.5. Use the duty uniform, field jacket with hood, and standard footwear as personal protection. Expedient respiratory protection is available through handkerchiefs, T-shirts, towels, etc. If available and considered necessary, use the protective mask for added protection. Tape uniform openings shut.

A2.6.3. For a CB attack:

A2.6.3.1. If available, verify the integrity of the filtration and over pressurization systems. Direct personnel in the shelter to utilize the appropriate amount of individual protection i.e., IPE immediately available but not worn, mask only worn, full IPE worn, etc.

A2.6.3.2. Implement contamination control/avoidance procedures for all personnel performing outside mission essential tasks.

A2.6.3.3. Initiate the appropriate level of chemical-biological agent decontamination. Decontaminate and process equipment through a CCA. Remove protective coverings from items before placing them in the airlock. Remove vapor contamination from equipment and supplies by allowing the items to off gas.

NOTE: Decontaminate masks in the CHA/VHA and pass them into the TFA (in a sealed water-proofing bag) following a chemical attack.

A2.6.3.4. Wear IPE in accordance to technical directives specified in this AFMAN when directed by the installation commander.

A2.7. Shelter Equipment.

A2.7.1. Plan for the following equipment requirements.

A2.7.1.1. Each shelter should have a shelter kit. Contents may vary; however, each kit should have:

A2.7.1.2. First aid kit sufficient for the expected number of shelterees and their likely medical needs.

A2.7.1.3. Floor plan identifying preplanned areas (to include key item locations, e.g., dosimeters, other detection and warning devices, and fire extinguishers) and emergency utility shut off locations.

A2.7.1.4. Base grid map with medical facilities, shelters, control centers, and key phone numbers indicated.

A2.7.1.5. SMT identification devices (e.g., badge or armband).

A2.7.1.6. T.O.s and operational manuals for the shelter system, other support equipment, and specialized equipment.

A2.7.1.7. Shelter directives and operational checklists to cover all shelter operation aspects.

A2.7.1.8. Administrative supplies needed for maintaining personnel accountability, exposure control, and log of events, etc.

A2.7.2. Supplies and equipment are needed for effective shelter operation. Below are items that may be useful. The list is not all inclusive and serves only as a guide.

A2.7.2.1. Chemical-Biological Warfare Defense Equipment. Table A2.1. Contains chemical warfare defense equipment recommended to be stocked in the shelter.

Table A2.1. Chemical-Biological Warfare Defense Equipment.

Contamination Marking Kits	Filter Sets	Mask Spare Parts
Decontamination Kits	Glove Sets	Overboots
Detectors	Hoods	Overgarments

A2.7.2.2. Cleaning Supplies and Consumables. Table A2.2. Contains cleaning supplies and consumables recommended to be stocked in the shelter.

Table A2.2. Cleaning Supplies and Consumables.

Alcohol Pads	Hose	Rubber Bands
Bleach	Light Bulbs	Wood Handles
Brooms and Brushes	Light Sticks	Sawdust
Cardboard Boxes	Masking Tape	Soap
Detergent Spray	Mops (extra heads and handles)	Sponges
Disinfectant	Mop Bucket and Wringer	Toilet Paper
Dry Sorbent Powder	Paper Cups	Trash Cans
Dust Pan	Paper Towels	Trash Can Liners
Flashlights (spare components)	Plastic Bags	Wet Wipes
Floor Mats	Rags	
Hand Cleaner	Rope	

A2.7.2.3. Furniture and Equipment. Table A2.3. Furniture and equipment recommended to be stocked in the shelter.

Table A2.3. Furniture and Equipment.

Chairs	Storage Lockers	Wooden Stools
Cots	Tables	
Mobility Bins	Vacuum (Hepa Filter)	

A2.7.2.4. Health and Comfort Items. Table A2.4. Contains health and comfort items recommended to be stocked in the shelter.

Table A2.4. Health and Comfort Items.

Clothing	Mirrors	Thermometer
Blankets	Pillows	Tooth Paste and Brushes
Deodorant	Shaving Gear	Towels
Ear Protection	Sleeping Bags	

A2.7.2.5. Other Miscellaneous Items. Table A2.5. Contains other miscellaneous items recommended to be stocked in the shelter.

Table A2.5. Other Miscellaneous Items.

AM/FM Radio	**Crowbar**	**Recreation Equipment**
Antenna/Adapter Cable	Entrenching Tool	Shuffle Box
Battery Charger	Flags	Shovel
Can Opener	Hand Held Radios	Shower Head
Clothes Line	Knives	Spare Batteries
Clothes Pins	Megaphone	Tent
Coffee Pot	Portable Siren	Wall Clock

A2.7.2.6. RADIACS. Table A2.6. contains the RADIAC items recommended to be used for shelter operations.

Table A2.6. RADIACS.

High and Low Range CDV instruments	Dosimeters and Chargers
ADM-300 Radiacs	

A2.8. Individual Protective Equipment Disposition. Process equipment contaminated with vapor/liquid/solid chemical warfare agents as described below and using **Table A2.13.** for refurbishment of mission critical equipment. Coordinated base planning is necessary to identify decontamination facilities and contaminated waste disposal areas, and to develop operating procedures. Avoid extensive decontamination, because it is labor and resource intensive and not always effective.

A2.8.1. The overall decontamination method for the BDO is aeration. However, if the overgarment (BDO/CPO) is initially decontaminated soon after contamination fall (within 15 minutes) with the M291/M295 Decontamination Kit, the amount of chemical warfare agent absorbed by the OG could be greatly reduced. Furthermore, decontaminating with the M291/M295 will enhance the protection capability afforded by the OG. Although the BDOs may present a vapor hazard, they may have to be reused if OG stocks are depleted. Wearers of previously contaminated BDOs should be observed for any indication of chemical-biological agent exposure. At the present time CPOs cannot be reconstituted.

A2.8.2. Aerate BDOs outside the TFA and CCA boundaries. The area selected should provide protection from additional liquid contamination and a means of hanging the OG for aeration (racks are provided with the CAPS or the clothesline method is adequate). Special consideration is needed in open air CCAs to ensure that contaminated BDOs are aerated away from the TFA and mask removal point. Splinter protection is desirable. Aeration time depends on the temperature, amount and agent type, humidity, and airflow. To ensure aeration time is tracked, attach a tag, tape, etc to each BDO with the date and start time of aeration.

A2.8.2.1. Special consideration should be made to whether or not the BDOs were liquid/solid or vapor contaminated. Separate vapor from liquid contaminated suits and only reuse the liquid contaminated suits as a last resort.

A2.8.2.2. BDOs contaminated with VX may take weeks to decontaminate to acceptable levels, and is therefore aeration is not considered a viable option.

A2.8.2.3. Specific aeration times for all variables do not exist. For most agents, at least 72 hours at temperatures above 60 degrees should be sufficient to prevent a contact hazard. However, after one hour of aeration, contamination levels are significantly reduced and may no longer present a transfer hazard. For monitoring purposes, wait 24 hours before initially monitoring aerated suits with the CAM.

A2.8.2.4. Even though the BDO has been aerated, its mission effectiveness may have been degraded by the previous chemical agent exposure.

A2.8.3. Ensure sufficient OG's are available at the CCA to support extended mission operations. Deplete new stocks before reusing previously contaminated BDOs.

A2.8.4. Monitor previously contaminated BDOs with the CAM before removing them from the aeration area. Example method: Place the suit into an enclosed container, i.e. plastic bag to concentrate the vapors and then perform CAM check. CAM must read 0 bars to reuse suits. Inform personnel being issued the previously contaminated suits that they were contaminated and that they should watch closely for any signs of CW agent exposure.

A2.8.5. Protective masks with liquid/solid contamination on the exterior surfaces, that are otherwise serviceable, will be serviced for reuse. Replace the hood, eyelens, outserts, and inlet valve caps (M17 series mask), when the mask is serviced. Change filter or canister elements according to technical order guidance. Discard masks with contamination on the interior surfaces.

A2.8.6. Groundcrew Protective gloves, cotton inserts, footwear covers, and hoods contaminated with liquid agents are discarded. Certain EOD and Fire equipment are refurbished for reuse. See **Table A2.13.** for MCE refurbishment procedures.

A2.8.7. Retain all other equipment, not addressed above for reuse, if it does not present a hazard. If decontamination is necessary, follow the procedures in T.O. 11C15-1-3.

A2.9. Shelter Checklist and Sign Requirements.

A2.9.1. Checklist Requirements. In most cases, checklists should be specific enough to allow an untrained person to accomplish all needed actions.

A2.9.2. The unit should develop checklists for unit control center and shelter interface.

A2.9.3. The SMT should develop implementing instructions for shelter operation. These instructions should include activation, shelter operation, equipment operation, contamination control, and deactivation for their specific shelter. Also, the SMT may require untrained assistants for specific tasks necessary in the shelter. The number of assistants, task distribution, and combining of tasks are flexible and determined by the SMT. The SMT should develop checklists for untrained assistants to follow. (as a minimum):

A2.9.3.1. Casualty Care Tasks. Establish a first aid and buddy care capability for the shelter. Arrange for casualty transportation to casualty collection points or medical facilities, if necessary.

A2.9.3.2. Security Tasks. Secure all points of entry or exit when the shelter is operational. Use only one entrance and exit. Provide security for supplies and equipment critical to the mission. Maintain order and discipline in the shelter.

A2.9.3.3. Fire Control Tasks. Inspect the shelter each shift to identify potential fire sources. Brief shelterees on fire suppression equipment location and ensure it is operational. Plan for evacuation in case the shelter becomes uninhabitable. Designate reassembly points and a methods to ensure everyone is evacuated.

A2.9.3.4. Supply Tasks. Coordinate consumable resupply with the control center responsible for the consumables.

A2.9.3.5. Subsistence Tasks. Follow guidance from the base services unit. Implement the shelter stocking plan.

A2.9.3.6. Sanitation Tasks. Plan for and maintain sanitation in the shelter to prevent disease. Remove solid waste (garbage, trash, unusable clothing, etc.) from the shelter on a regular basis. Usually, this can be done as shelterees out process. Human waste disposal is another critical area. Use built-in toilet systems and plan for back-up systems in emergencies. If the shelter does not have a built-in toilet, develop a make shift system. Consider using trash cans with garbage bag liners. Frequent removal is required. Plan for shelterees to clean their hands before eating, after toilet use, and after handling garbage to minimize disease.

A2.9.3.7. Administrative Tasks. Keep an events log from the time the shelter is activated until deactivation. Include all significant events for the shelter, directed actions from higher authority, and communications between the shelter and the unit control center. Report casualties and deceased persons to the unit control center for relay to the medical control center, mortuary control center, and personnel readiness unit. Take all shelter administrative records when evacuating.

A2.9.3.8. Mortuary Tasks. Report all deaths as soon as possible, and follow the mortuary control center instructions for remains disposition.

A2.9.3.9. Sleeping Tasks. Plan for and operate a sleeping area for the shelter. Provide sleeping accommodations for each expected shelter occupant.

A2.9.3.10. Recreation Tasks. Plan and conduct regular recreation sessions during extended shelter operations.

A2.10. CCA Supervisor and Attendant Guidelines. The following information is provided to help the CCA supervisor and assistants perform their duties. They are especially important to the CCA assistants because they are not predesignated and trained. It may be necessary for one person to perform the tasks in more than one area and it may be possible to divide the tasks in a single area between several personnel. You may have to modify the information to add CCA-specific designs, equipment, supplies, and available manpower to fit your mission needs. If staffing allows, it's a good idea to have an assistant located in the holding area who can answer questions concerning the procedures and direct people to the appropriate processing line, thereby equalizing the flow of personnel and minimizing bottle necks.

A2.10.1. CCA Supervisor Actions. Use **Table A2.7.** for the CCA supervisor's actions.

Table A2.7. CCA Supervisor's Actions.

CCA SUPERVISOR'S ACTIONS
1. Coordinate with the shelter supervisor or NBC Control Center for required assistants. a. Brief assistants and provide them with checklists. b. Set work, rest, and replacement cycles for assistants c. Supervise assistants.
2. Set up the CCA and post instructions. a. As personnel leave the transportation point, they should be directed (either by signs or attendant) to the contamination control area. Monitor and prompt personnel processing to: - Follow all instructions carefully. - Touch only the outside of clothing. b. Ensure decontamination kits are placed throughout the line. Restock if necessary. One M295 per individual processing is the minimum required at the Arrival and Initial Decon Area. c. Ensure all footwear shuffle boxes are filled with a 5% chlorine solution. (Household bleach). Note: The boxes should be filled to the point that the solution covers the bottoms and sides of the overboots but not to the point that it rises well up into the OG pant leg area. Refill as necessary d. Ensure all glove wash troughs are filled with the 5% chlorine solution and the rinse troughs are filled with water. Refill as necessary. e. Ensure benches are available to facilitate footwear cover removal f. Ensure barrels/hampers and liners are at each station for discarded clothing and equipment. Empty with they become full. g. Determine the location of areas designated for contaminated waste and trash disposal, OG aeration, and other IPE decontamination. h. Ensure equipment and decontaminants are available to decontaminate the CCA.
3. Coordinate CCA restocking with the shelter supervisor.
4. Establish a clean egress route and post instructions.
5. Maintain a steady processing flow.
6. Clean and refurbish the lines regularly i.e., remove trash, empty OG hampers, refill chlorine.
7. Decontaminate and refurbish the CCA items regularly.

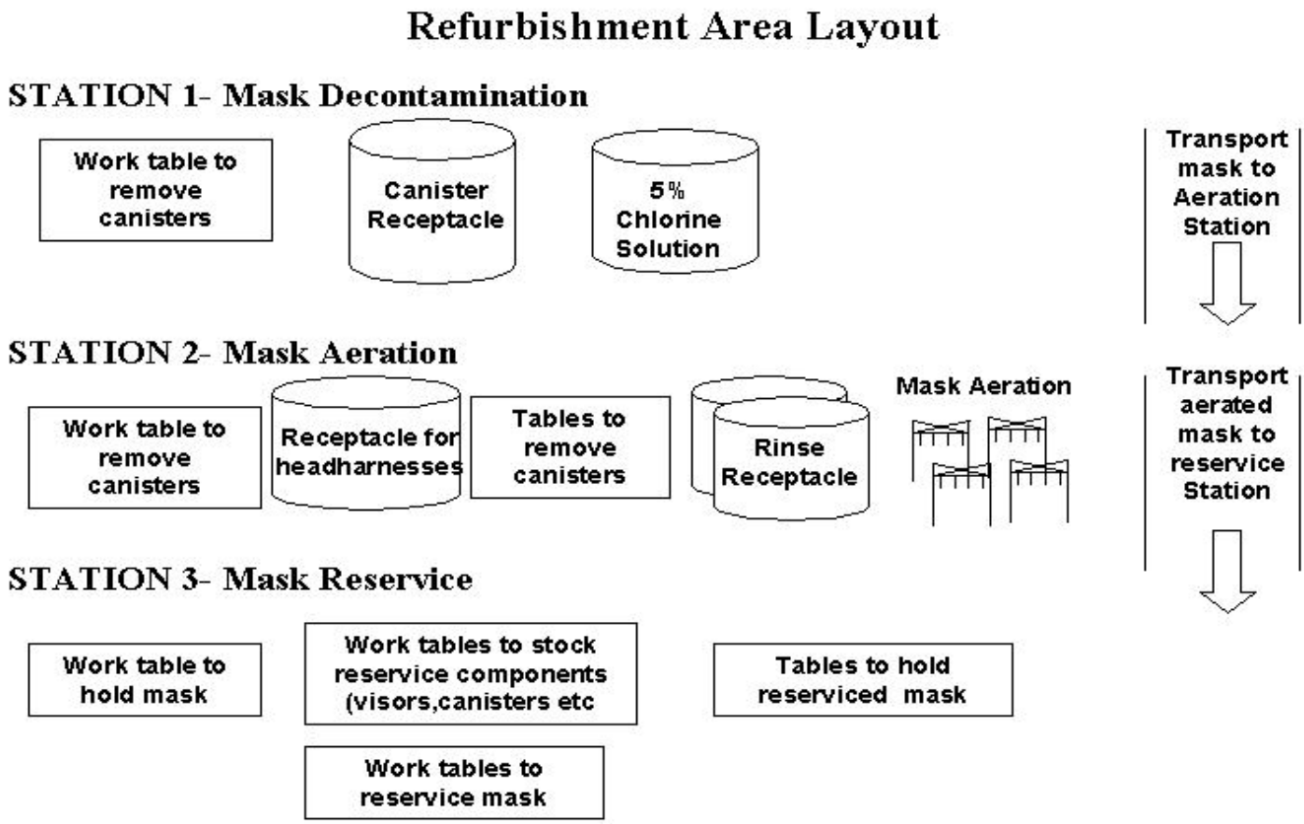
8. **Refurbishment Area** - Ensure work space, spare mask parts, hoods, cloths, decontamination solutions, sponges, water, M291/M295 decontamination kits are available for cleaning and servicing masks. Restock supplies as necessary - Ensure containers and liners are available for removed items. - Ensure an overgarment and duty uniform aeration area is designated.
9. If there are instances where personnel must doff their underclothing, ensure the mask and clothing are removed from the hampers or airlock regularly.

A2.10.2. CCA Assistant Actions. Use **Table A2.8.** for the CCA Assistant's Actions.

Table A2.8. CCA Assistant's Actions.

CCA ATTENDANT'S ACTIONS
1. Keep decontaminant containers filled with 5% chlorine solution.
2. Collect, bag, and dispose of contaminated rubber IPE, as required.
3. Collect bag, and process classified material throughout the line, if required.
4. Collect and transport mission critical equipment to the Refurbishment Area.
5. Retrieve and store decontaminated IPE when needed.
6. Coordinate with the shelter supervisor to restock the CHA supplies.
7. Clean, monitor, and decontaminate the CHA; remove trash and contaminated items as necessary.
8. Pick up deposited masks from the Mask Monitoring/ Removal Area and transfer them to the Refurbishment Area. Once the mask are refurbished transport to the TFA.
9. Refurbish Mission Critical Equipment (MCE) See **Table A2.13.**
10. Transport aerated and refurbished MCE to the TFA.
11. Collect, separate, and stow duty uniforms.
12. Dispose of glove inserts and underwear.

Figure A2.1. Protective Mask Refurbishment Area Layout



A2.11. CCA Signs. Signs should be displayed in a chemical-biological CCA to guide personnel through the process of doffing and donning their IPE. The signs should be concise and readable to be effective and are based on the premise that processees have been trained in CCA processing procedures. Signs may be enhanced by including dual language, if required, and developing graphics and illustrations depicting processing procedures. List only the key steps to be performed at each station. Number each station and keep the steps in the area and in the sequence similar to the following:

A2.11.1. Ingress Signs: Use **Table A2.9.** for CCA Processing Procedures. **Note:** The procedures for JFIRE processing are recommended only.

Table A2.9. CCA Processing Procedures

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
STATION 1					
Arrival and Initial Decontamination Area					
1. Split into two person "buddy" teams. **Note: Try to team with an individual wearing the same protective overgarment.**	*	*	*	*	
2. Disconnect Velcro for hose/canister and allow to hang freely.			*		
WARNING!! **Using two fingers apply pressure to the mask front voicemitter and to the beard of the JFIRE to hold the mask firmly in place and prevent loss of mask seal integrity.**					
3. Thoroughly decontaminate yourself and all exterior equipment, including your weapon, using the M295 decontamination kits provided. Buddies should assist each other in hard to reach areas. Special interest should be given to gloves, hood/mask, and filter canisters.	*	*	*		
4. Discard used M295 decon kits into the trash hamper.	*	*	*		
5. EOD buddy teams spray the 5% chlorine solution, using the multipurpose sprayer (pump pressurized) to all exposed areas of the Level A Suit.				*	
6. Proceed to the **Weapons Clearing, Wash and Holding Area.**	*	*	*	*	
Weapons Clearing, Wash and Holding Area					*
1. Complete Weapons Clearing/Turn In (If required) prior to decontaminating gloves and overboots.	*	*	*	*	
2. Step into Boot Wash Tray.	*	*	*	*	
3. Wash Gloves in Decon Tub.	*	*	*	*	
4. Rinse Gloves in Rinse Tub.	*	*	*	*	
5. If a holding area is not established, proceed directly to the **Equipment Removal Area.**	*	*	*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
Holding Area					
NOTE!! **EOD Personnel wearing Level A Suits will proceed directly to Station 3 - Overboot Removal Area. Decontaminate boots in foot trays provided along the way.** The Holding Area is designed to allow shade for personnel, turn in Classified material and ask any questions prior to processing. Informational signs may be developed for personnel to read while waiting. **1**. Attendant will obtain classified material. Place in an airtight bag and label it with the individuals Name, Rank, SSAN. The individual will receive the classified before the leaving the CCA to the TFA. The following information could be posted within this area. **1.** Carefully read the notices posted on the information boards prior to beginning your processing. **2**. Remove your individual protective equipment (IPE) in the order specified by the posted instructions. **Important!!** **Turn in all Classified Material. It will be returned to you before leaving the CCA.**				*	
External Equipment Removal Area					
WARNING!! **Take great care when doffing items. Do not remove mask or any chemical protective clothing. Contact hazard transfer to exposed skin and/or the respiratory tract can lead to sickness or death.**					
1. Undo the Velcro attachments on your hood underarm straps.	*				
2. Re-attach underarm straps over the shoulder.	*				
3. Remove all external items other than protective mask and overgarment and place on racks. These items include Helmet, Vest (aircrew), Web Gear, Mask Carrier, Flak Vest, Cold/Wet Weather Gear and other non-essential items. **IMPORTANT: Do not let previously deconned equipment touch the ground.**	*	*	*		
4. Empty all overgarment pockets and place items in hampers.	*	*	*		
5. Decontaminate and rinse gloves in tubs provided.	*	*	*		
6. Proceed to **Station 2 – Mask Wipe and Hood Removal Area.** Decontaminate boots in foot trays provided along the way.	*	*	*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
STATION 2					
Mask Wipe and Hood Removal Area					*
WARNING!! **Using two fingers apply pressure to the mask front voicemitter and to the beard of the JFIRE to hold the mask firmly in place and prevent loss of mask seal integrity.**					
1. Individual will:					
• Face the attendant and apply pressure to the front voicemitter.	*	*	*		
• Firefighters will hold mask in place with 2 fingers on the beard/breathing valve.			*		
2. Attendant will:					
• Loosen processee's hood drawstring.	*				
• Wipe down eyelens outserts and around the filter element using the 5% chlorine solution.	*	*			
• Wipe all exposed areas of the interspiro CW mask (lens and canister) with the 5% chlorine solution.			*		
• Repeat wipe down procedure with water.	*	*	*		
• Pull hood over processee's head and cut temple straps.	*				
• Pull the hood off the mask and drop it in the hamper.	*				
3. Attendant and individual will:					
• Decontaminate and rinse gloves in tubs provided.	*	*	*		
4. Individual will:					
• Proceed to **Station 3 – Overboot Removal Area.**	*	*	*		
IMPORTANT! **JFIRE personnel proceed directly to Station 3 - Protective Overgarment Removal Area.**			*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
STATION 3					
Overboot Removal Area					
IMPORTANT!! **While waiting in line, read all instructions for this station and watch the other processing teams in front of you.**					
1. Proceed to the first available bench as a buddy team, sit on opposite ends of the bench with boots resting on the "dirty" side of the bench.	*	*		*	
2. Undo both of your Velcro pant leg fasteners and unzip/untie leg fasteners completely.	*	*			
3. Undo all overboot fasteners.	*	*			
4. The outer pant leg of the Level-A suit is pulled up to fully expose the bunker boots.				*	
5. One individual will lift their leg closest to the center of the bench and rests it on the bench as your buddy removes the overboot/bunker boot and drops it into the hamper. Once the overboot/ bunker boot is removed place your foot on the clean side of the bench as you now straddle the bench.	*	*		*	
6. The other individual will complete the same procedures until both processees are straddling the bench.	*	*		*	
7. Utilizing the "Buddy" system the remaining boot is processed in the same manner.	*	*		*	
8. Wipe down bench with 5% chlorine solution.	*	*		*	
9. Decontaminate and rinse gloves in tubs provided and proceed to the **Protective Overgarment Removal Area.**	*	*		*	
Protective Overgarment Removal Area					
Important!! **Working as a buddy team, Do not sit, squat, kneel or touch the inside of the overgarment, bunker pants or Level A Suit as you remove them. One processee performs the procedure followed by his/her buddy.**					

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
Battle Dress Overgarment (BDO)					
BDO Trouser Removal					
1. Buddy will:					
• Unsnap rear snaps, untie waist cord, loosen side pull straps and unfasten front fly closure.	*				
2. Individual will:	*				
• Turn and face away from their buddy.	*				
3. Buddy will:					
• Lower the individual's pants to their knees. **Do not turn pants inside out as you remove them**	*				
4. Individual will:					
• Steady his/herself by holding on to the rack and extend their foot back one at a time.	*				
5. Buddy will:					
• Remove the individual's trousers and place them into the containment hamper.	*				
Important:					
Stand to the side of your buddy as you remove the pants.					
This prevents the pants rubbing against you.					
6. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.	*				
7. Repeat procedures for doffing buddy.	*				
BDO Jacket Removal					
1. Buddy will:					
• Loosen zippers, velcro fasteners, and untie the drawstring on the front of the jacket.	*				
• Undo Velcro attachment points on each sleeve cuff.	*				
2. Individual will:					
• Turn and face away from your buddy, straighten and hold fingers together in order to keep gloves on and hold arms behind you.	*				

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
3. Buddy will:					
• Pull the jacket down and away from the individual's shoulders helping them remove their arms from the sleeves one at a time.					
- Elastic sleeve cuffs – Jacket will come off inside out.					
- Velcro sleeves – Jacket will come off right-side out.					
• Place jacket in the containment hamper.	*				
4. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.					
5. Repeat the jacket removal steps for the doffing buddy and proceed to					
Joint Firefighter Integrated Response Ensemble (J-FIRE)					
Bunker pants and CPO trouser removal					
1. Individual will:					
• Push bunker pants down to the top of the bunker boots.			*		
• Reach through the CPO jacket and "pinch" hasp to release suspenders.			*		
2. Buddy will:					
• Unsnap and untie the waist elastic coat retention cord.			*		
• Unfasten the waistband hook and pile fastener tapes and front fly closures.			*		
3. Individual will:					
• Turn and face away from buddy.			*		
• Steady yourself by holding on to the rack. Extend your foot back one at a time.			*		
4. Buddy will:					
• Remove the bunker trouser, boot and CPO trouser at the same time and place them into the containment hamper.			*		
• Place an uncontaminated disposable plastic boot or sock on the foot before touching the ground.			*		
• Repeat the process for the other leg.			*		
5. Individual will:					
• Repeat this process for your buddy.			*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
6. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.			* *		
Firefighters will remove CPO Jacket according to the CPO removal procedures below.					
Chemical Protective Overgarment (CPO)					
CPO Trouser Removal					
1. Individual will:					
• Reach through your jacket and "pinch" hasp to release suspenders.		*			
2. Buddy will:					
• Unsnap and untie the waist elastic coat retention cord.		*			
• Unfasten the waistband hook and pile fastener tapes and front fly closures.		*			
3. Individual will:					
• Turn and face away from their buddy.		*			
4. Buddy will:					
• Lower the individual's pants to their knees.		*			
IMPORTANT!! **Do not turn pants inside out as you remove them**					
5. Individual will:					
• Steady themselves by holding on to the rack. Extend your foot back one at a time.		*			
6. Buddy will:					
• Remove the individual's trousers and place them into the containment hamper.		*			
7. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.		*			
8. Repeat procedures for doffing buddy.		*			

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
CPO Jacket Removal					
1. Buddy will disconnect the canister and hose assembly and secure it around breathing valve filter away from the CPO jacket.			*		
2. Your buddy will loosen zippers, and hook and pile tape on the front of the jacket, the jacket sleeves and the hood.		*	*		
3. Turn and face your buddy; Lean slightly forward with chin out and head up.		*	*		
4. Your buddy will stretch CPO hood out and pull back and roll back (inside out). away from your head.		*	*		
5. Turn and face away from your buddy, straighten and hold fingers together and hold arms behind you.		*	*		
6. Your buddy will pull the jacket down and away from your shoulders helping the processee remove their arms from the sleeves one at a time. **Note: Your arms should come out of the coat without turning the sleeves inside out.**		*	*		
7. Place jacket in the containment hamper.		*	*		
8. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.		*	*		
9. Repeat all above procedures for doffing buddy.		*	*		
10. Proceed to **Station 4 - Glove Removal Area.**		*	*		
EOD - HAZMAT Level A Suit					
Important: Each of the following steps requires the assistance of your buddy.					
1. Unfasten the belt inside your suit and don your chemical protective rubber gloves, which is also stored inside the suit.				*	
2. Open the velcro closure and zipper.				*	
3. Pull the suit down to knee level ensuring the outside of the suit does not contact the uniform or skin in the process.				*	
4. Remove the suit one leg at a time by lifting your leg backward and pulling it free from the leg and foot. Place a plastic sock or bootie on the exposed foot before it touches the ground.				*	
				*	

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
Note: Once the suit is unzipped, you may switch the CW interspiro mask from bottled air to ambient air.				*	
5. Place the suit in the hamper.				*	
6. Processee and buddy will decontaminate and rinse gloves in tubs provided and proceed to **Station 4 - Glove Removal Area.**				*	
STATION 4					
Glove Removal Area					
WARNING!! **Avoid contact with the outside of your rubber glove with your unprotected hands**					
1. Work both rubber gloves off at the same time and drop into hamper.	*	*		*	
2. Work the Fire/CW protective gloves at the same time until they are halfway off and drop into hamper.			*		
3. Proceed to the **Mask Monitoring/Removal Area.**	*	*	*	*	
Mask Monitoring Removal Area					
1. Individual will: • Face the attendant, spread legs apart and hold arms out to your side with your palms up.	*	*	*	*	**1 Per Monitoring Line**
2. Attendant Will: • Monitor individual using the CAM. (See procedures below)	*	*	*	*	
3. If cam bar readings are **less** than the CAM Monitoring Chart, the individual will remove their mask according to the Mask Removal procedures below.	*	*	*	*	
4. If cam bar readings are equal or greater to what is listed in the CAM Monitoring Chart, the individual will: - Don clean gloves and proceed to the **Uniform/Undergarment Removal Area.**	*	*	*	*	

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
CAM Monitoring Procedures					
1. Monitor the front and rear of the processee using an **X** pattern (if desired) and also monitor the outline of the body.	*	*	*	*	
2. Have the processee face away and extend their foot back one at a time and monitor the bottom of each foot.	*	*	*	*	
3. During monitoring pay special attention to the palms, wrists, ankles, neck, and bottom of feet.	*	*	*	*	
Mask Removal Procedures					
IMPORTANT!! **The attendant will document the individuals name and SSAN on a mask ID tag before the individual removes the mask**					
1. Attendant will:					
• Ask the individual their name and SSAN and write it on the mask tag.	*	*	*	*	
• Bring nomex hood forward so it rest over the mask.			*		
2. Individual will:					
• Using both hands, grasp lower headharness straps, take three deep breaths, holding the last one.	*	*	*	*	
3. Pull mask out and away from face, remove mask and the self contained breathing apparatus (if applicable) and place on table.	*	*	*	*	
4. Attendant will:					
• Attach the mask tag to the headharness buckle and place the mask in the container.					
5. Individual will:					
• Continue holding breath, obtain classified material (if applicable) and with eyes open **walk** to the Toxic Free Area.	*	*	*	*	
Uniform/Undergarment Removal Area					
Caution!! **Bending too far forward in the mask may cause the seal of the mask to leak on some individuals. Use the boot step (CAPS only) to elevate your foot when untying the combat bootlaces.**					

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
1. Place foot on boot step (CAPS only) and untie combat boots.	*	*	*	*	
2. Hold onto the rack for balance and remove combat boots, or disposable booties. You may use the boot remover (CAPS only) if you desire.	*	*	*	*	
3. Remove your BDU shirt and place it into the hamper.	*	*	*	*	
4. Remove your BDU pants and place it into the hamper.	*	*	*	*	
5. Return to the Mask Monitoring/Removal Area.	*	*	*	*	
EMERGENCY CCA PROCEDURES					
If cam bar readings are the same upon remonitoring, take the following emergency steps:					
1. Immediately stop CCA operations.					
2. Monitor surrounding area within the VHA to verify levels and look for any potential hot spots.					
3. If hot spots are found decontaminate by using decontamination kits, washing down area with 5% chlorine solution, sealing, removing, and covering.					
4. Once levels are below the ones listed in the CAM Monitoring Chart, continue CCA operations					
5. If levels have not changed - Check serviceability of CAMs. Replace as necessary and remonitor area. - Verify wind direction. Ensure you are still downwind or crosswind. If not, the CCA must be relocated to an upwind or crosswind location.					

A2.11.2. Egress Signs: Within the egress section of the area, utilize these signs to provide information concerning proper IPE wear and indicate what the current alarm condition and MOPP level are at the main base. Use **Table 2.10.** for Egress Processing. For example, you might have signs that read:

The current alarm condition, MOPP level and variation is _____.

Table 2.10. CCA Egress Processing.

EGRESS PROCESSING STEPS	BDO	CPO	JFIRE	Attendant
STATION 1. TFA MASK DONNING POINT				
1. Remove your mask from the waterproofing bag.	♦	♦	♦	
2. Inspect the mask for correct size, visual defects, etc. IAW the Technical Order.	♦	♦	♦	
3. Document the inspection on the DD Form 1574, *Equipment Serviceability Tag.*	♦	♦	♦	
4. Don and fit the mask.	♦	♦	♦	
5. Check the mask seal.	♦	♦	♦	
6. Proceed to **GLOVE DONNING POINT.**	♦	♦	♦	
STATION 2. GLOVE DONNING POINT				
1. Remove gloves and inserts from the vapor bag (if applicable).	♦	♦	♦	
Note: Chemical Fire Fighter gloves must be separated from rubber gloves.				
2. Inspect the gloves for proper size and any physical damage.	♦	♦	♦	
3. Don the glove inserts and gloves.	♦	♦	♦	
4. Proceed to **TROUSER DONNING POINT**.	♦	♦	♦	
STATION 3. TROUSER DONNING POINT				
1. Ensure all OG trouser hook and pile fasteners, zippers, and suspenders are fully open.	♦	♦	♦	
2. Don the trousers and secure waist fasteners and suspenders leaving leg adjustments open.	♦	♦	♦	
3. Proceed to **OVERBOOT DONNING POINT.**	♦	♦	♦	
STATION 4. OVERBOOT DONNING POINT				
1. Remove overboots/Fire Fighter boots from the vapor bag (if applicable).	♦	♦	♦	
Note: Fire Fighter boots should be separated from overboots.				
2. Inspect the boots for proper size and any physical damage.	♦	♦	♦	
3. Don overboots over the combat boots and secure.	♦	♦	♦	
4. Adjust the OG trouser legs over each overboot and close and fasten around the overboot.	♦	♦	♦	
5. Proceed to **OVERGARMENT COAT DONNING POINT.**	♦	♦	♦	
STATION 5. OVERGARMENT COAT DONNING POINT				
1. Ensure all coat fasteners and zippers fully open.	♦	♦	♦	
2. Don the coat and secure fasteners.	♦	♦	♦	
3. **CPO**: Secure the hood over the protective mask. Close the hood drawcord strings to form the hood around the mask.		♦	♦	
		♦	♦	
4. Place the coat sleeves over the protective gloves and secure the hook and pile tape on each sleeve to a snug fit.	♦	♦	♦	
	♦	♦	♦	
5. **CPO** : Secure the waist retention cord.		♦	♦	
6. Perform a buddy check of the OG donning.	♦	♦	♦	
7. Proceed to **EQUIPMENT PICK-UP POINT.**	♦	♦	♦	

EGRESS PROCESSING STEPS CONTINUED	BDO	CPO	JFIRE	Attendant
STATION 6. EQUIPMENT PICK-UP POINT.				
1. Place M9 paper on the OG as directed.	♦	♦	♦	
2. Don personal protective equipment (helmet, body armor, web belt, etc.)	♦	♦	♦	
3. Sign-out of the CCA.	♦	♦	♦	
4. Proceed to **TRANSPORTATION PICK-UP POINT.**	♦	♦	♦	
5. Remain under overhead cover and exercise contact contamination avoidance techniques for yourself and your equipment until transportation arrives.	♦	♦	♦	
6. Ensure you have:				
- You have your M8/M9 paper, skin decon kit, and nerve agent antidotes	♦	♦	♦	
- Your footwear covers are secure				
- Your gloves are tucked underneath your sleeves				
- Your snaps are fastened and your drawstrings are tied				
7. Embark on transportation vehicle to your duty location drop-off point.	♦	♦	♦	

Table A2.11. CAM Monitoring Risk Matrix Chart (CCA Line)

CAM SCALE	CAM BAR READING
H	**3 or more bars** **Do Not Remove Protective Mask**
G	**1 or more bars** **Do Not Remove Protective Mask**

Table A2.12. CAM Monitoring Risk Matrix Chart (Refurbishment and Aeration Area)

CAM SCALE	CAM BAR READING
H	**1 or more bars** **Continue refurbishment or aeration until 0 bars**
G	**1 or more bars** **Continue refurbishment or aeration until 0 bars**

Table A2.13. Mission Critical Equipment Refurbishment Procedures.

Refurbishment Procedures
BDO
Preparing the BDOs for aeration. 1. Inspect for serviceability. 2. Brush off excess decontaminant. 3. Check suits for signs of liquid contamination. 4. Separate vapor contaminated suits from liquid contaminated suits. 5. Remove M9 tape. 6. Sort the BDOs by size to ease future identification. 7. Tag each overgarment with the date and start time of aeration. 8. Hang BDOs for aeration. See **A2.8.2.** for additional guidance on overgarment aeration. 9. Monitor with a Chemical Agent Monitor (CAM) prior to removing them from aeration. See **Table A2.12.** for monitoring guidelines.
MCU-2A/P and M-45 Mask Refurbishment Procedures See **Figure A2.1.** for example of station layout.
Station 1 - Mask Decontamination – 1 Attendant
1. Remove and discard the filter canister. 2. Submerge the mask in a 5% chlorine solution for 30 seconds.
Station 2 – Mask Aeration –2 Attendants (Recommended)
Preparing Mask for Aeration 1. Remove the head-harness from the mask and submerge in water for approximately two minutes. **Note:** Remove the head-harnesses by cutting the straps immediately below the metal tab and discard the headharness. 2. After the two-minute rinse, remove the eyelens cover and wipe the cover with a dry towelette. 3. Hang mask for Aeration.
Station 3 – Mask Re-Service – 1 Attendant This Station attendant is responsible for removing the mask from aeration and preparing them for re-issue.
Prior to removing the mask from aeration the attendant will monitor the inside and outside of the mask with a Chemical Agent Monitor (CAM). See **Table A2.12.** for monitoring guidelines. **Preparing the mask for re-issue** 1. Refit the mask with an eye lens cover and place a new head-harness inside the mask. The processee is responsible for replacing the head-harness. 2. Conduct a visual inspection and replace parts as needed. 3. Transfer refurbished mask to the Vapor Hazard Area.

Refurbishment Procedures
Fire and EOD Specialized Equipment Refurbishment Procedures
Station 1 – Interspiro CW Mask Refurbishment
Note: Fire Department and EOD personnel will refurbishment the Interspiro CW Mask. 1. Disassemble the mask by removing the Nomex hood, C2 canister, hose cover, beard, voice cone and breathing valve assembly. 2. Seal the canister hose and discard the canister. 3. Hang up the Nomex hood, beard, and hose cover to aerate. Check with the CAM before reuse. See **Table A2.12.** for monitoring guidelines 4. Wipe the breathing valve assembly with 5% chlorine solution and rinse with water. 5. Submerge the disassembled mask in a 5% chlorine solution for 30 seconds and then rinse and agitate in a water solution for 30 seconds. 6. Hang the mask for aeration. See **Table A2.12.** for monitoring guidelines 7. Monitor the inside and outside of the mask with a Chemical Agent Monitor (CAM) prior to removing the mask from aeration. See **Table A2.12.** for monitoring guidelines. 8. Reassemble the mask and transfer to the Vapor Hazard Area.
Station 2 – Bunker Boots – 1 Attendant
1. Set boots into 4 inches of 5% chlorine solution for approximately 30 seconds. Scrub the bottom of the boots using a stiff brush. After wiping the sides of the boot with the chlorine solution, place the boot on the rinsing table. **Note:** Try and keep the inside of the boot as dry as possible. 2. Rinse the boots in the same manner as described in Step 1. 3. Hang boots upside down to aerate. 4. Monitor the boots with a Chemical Agent Monitor (CAM) prior to removing them from aeration. See **Table A2.12.** for monitoring guidelines. 5. Transport the boots to the VHA.
Station 3 - Firefighter Proximity Suit – 1 Attendant
1. Separate the exterior aluminized shell (silvers) from the interior bunker liners. 2. Separate the bunker suspenders from the proximity trousers. 3. Hang the bunker liners and suspenders for aeration. 4. Submerge the bunker silvers in a 5% chlorine solution for 30 seconds.

Refurbishment Procedures
5. Rinse by submerging them in a water solution for 30 seconds. 6. Hang the bunker silvers for aeration. 7. Monitor the bunker silvers with a chemical agent monitor prior to removing them from aeration. See **Table A2.12.** for monitoring guidelines. 8. Monitor the bunker liners and suspenders with a chemical agent monitor prior to removing them from the aeration rack. See **Table A2.12.** for monitoring guidelines. 9. Reassemble the bunker liners, silvers, and suspenders before transporting to the VHA.
Station 4 – Modified Structural ARFF Helmet – 1 Attendant
1. Submerge the ARFF helmet with aluminized dome cover and shroud (attachments) in the 5% chlorine solution for approximately 30 seconds. 2. Rinse the helmet and attachments with water in the same manner as step 1. 3. Place the helmet and attachments into aeration. 4. Monitor the helmet with attachments with a CAM prior to removing them from aeration before transporting to the VHA.
Station 5 – Fire Fighter/CW Protective Gloves – 1 Attendant
1. Submerge the gloves in the 5% chlorine solution for approximately 30 seconds. 2. Rinse the gloves by submerging and agitating in water for approximately 30 seconds. 3. Place the gloves into aeration. 4. Monitor the gloves with a CAM prior to removing them from aeration before transporting to the VHA. See **Table A2.12.** for monitoring guidelines

A2.12. Determining how many CCA's your base should setup:

A2.12.1. Ascertain the number of personnel the complex must support (2000 for example).

A2.12.2. Determine the agent's expected persistency time. This determination will result in one of two scenarios. The agent will remain in the area for a period of time that will require the entire population to process one or more times. The persistency of the agent is such that only those people whose OG was physically contaminated will require CCA processing.

A2.12.2.1. Entire base. In the event of having to process the entire base population:

A2.12.2.1.1. Use all available variables (mission requirements, weather, physical and mental condition of base populace, transportation capabilities, etc.) to determine the amount of time the leadership realistically believes each person should spend on shift. For our example, we'll use 8 hours as the baseline.

A2.12.2.1.2. Determine the amount of time it will take to establish the CCA/TFA complex. If it is already established, use a figure of two (2) hours. This amount of weathering will greatly reduce the contact hazard people bring with them to the CCA, thereby reducing the potential for casualties caused by cross contamination. In our example, we'll use a figure of 3 hours.

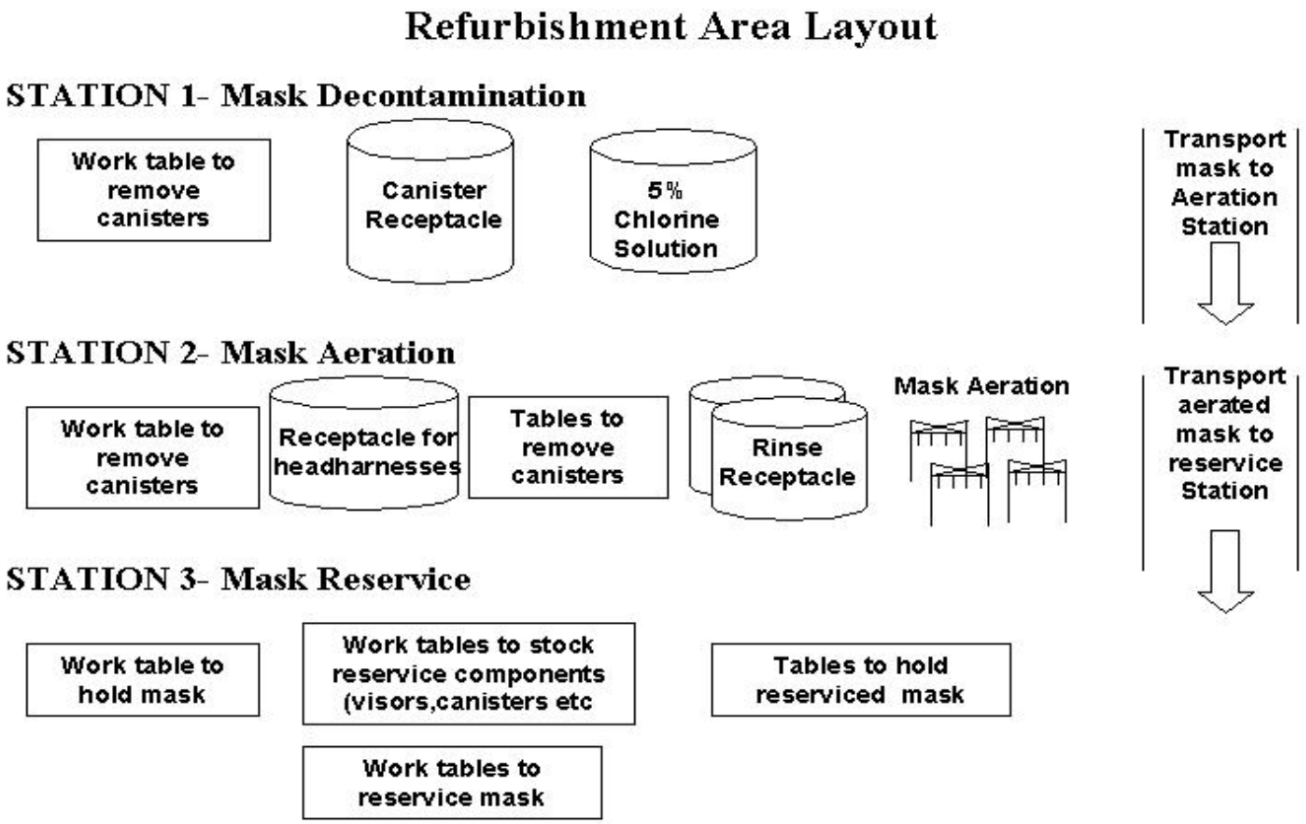
A2.12.2.1.3. Subtract the "establishment" time from the work cycle time (leaving 5 hours in our example).

A2.12.2.1.4. Divide the required number of people (2000 for our example) into the remaining hours (5). In our example, the installation is left with a processing requirement of 400 people per hour.

A2.12.2.1.5. Based on a processing rate of 70 people per hour, your installation would have to establish 6 ground crew CCA's. See **A2.1.** for CCA layout.

A2.12.2.2. Limited processing. In the event of only having to process people who contaminated their OG's.

Figure A2.1. Protective Mask Refurbishment Area Layout



A2.12.2.2.1. Assess the number of people who would be expected to be caught outside without overhead cover in the event of a missile attack. The adequacies of the installation's warning and notification system coupled with the base populace's competency are the drivers here. Add a safety factor (recommend 5 percent). For example, if we believed 10 percent of the base

populace would be caught outside, then we'd use 15 percent as our figure for this step. In our example, 15 percent would equate to 300 people.

A2.12.2.2.2. Assess the number of people, over and above the personnel thought to be contaminated in the last step, who will contaminate their OG (don't count gloves and overboots), during mission operations. We'll use another 100 people in our example. This brings the total contaminated populace to 400 people.

A2.12.2.2.3. Use all available variables (mission requirements, weather, physical and mental condition of base populace, transportation capabilities, etc.) to determine the amount of time the leadership realistically believes each person should spend on shift. The same rules apply here as in our earlier example EXCEPT that the contaminated populace should be processed shortly after the agent dissipates from the remainder of the installation if a situation exists where normal shift length exceeds agent persistency. We'll use 6 hours for this example.

A2.12.2.2.4. Determine the amount of time it will take to establish the CCA/TFA complex. In our example, we'll use a figure of 3 hours once again.

A2.12.2.2.5. Subtract the "establishment" time from the work cycle time (leaving 3 hours in our example).

A2.12.2.2.6. Divide the required number of people (400 for our example) into the remaining hours (3). In our example, the installation is left with a processing requirement of 134 people per hour.

A2.12.2.2.7. Based on a processing rate of 70 people per hour, your installation would have to establish 2 ground crew CCA's.

A2.12.3. Amplifications.

A2.12.3.1. If an installation is capable of operating multiple CCA/TFA locations simultaneously, either open-air or in conjunction with collective protection facilities, the total required processing lines can be distributed between the various locations.

A2.12.3.2. In the case where people only contaminated their gloves and/or overboots, these items can be decontaminated and disposed of in the following manner:

A2.12.3.2.1. Decontaminate gloves and overboots in a liquid solution containing 5 percent chlorine (straight bleach or suitable slurry).

A2.12.3.2.2. Remove overboots and discard into plastic bags (which will be transported to the contaminated waste disposal area).

A2.12.3.2.3. Remove gloves in typical "both at same time" manner and discard into plastic bags (which will be transported to the contaminated waste disposal area).

Attachment 3

RADIOLOGICAL EXPOSURE CONTROL

A3.1. General Information.

A3.1.1. This attachment provides basic information needed to understand nuclear environment effects, i.e. Fallout, with general protective procedures for personnel that may be exposed. It also includes the process of implementing radiological exposure control. Unit commanders should use the radiological exposure control system to control, within limits, personal radiation exposure. It also provides information needed to plan for survival, recovery, and mission operations in a fallout environment.

A3.1.2. Sources of Radiation. In simple terms, radiation sources following a nuclear detonation are categorized as initial radiation and fallout.

A3.1.2.1. Initial radiation is produced within 1 minute after the detonation. Most radiation produced by a nuclear weapon is released at this time and is very limited in range. A lethal exposure to initial radiation is not a main concern during shelter operations because anyone close enough to receive a lethal dose would probably be killed by the blast or heat.

A3.1.2.2. Fallout contains radioactive particulate matter produced by a nuclear detonation. Significant fallout occurs when a nuclear detonation contacts the ground or a large body of water, throwing tons of radioactive debris into the air. As the explosion settles down, the radioactive particles begin to fall back to the ground. The amount of fallout formed and its distribution over the land depends on many factors, such as the design of the weapon, size of the particles, height of the burst above the ground, terrain, weather conditions, etc.

A3.1.3. Categories of Fallout. Fallout may be divided into three phases: immediate, medium range, and long range.

A3.1.3.1. Immediate: (local fallout) The depositing of heavy debris within half an hour of the burst, which occurs mostly in the area in which physical damage is sustained.

A3.1.3.2. Medium range: That which is deposited between half an hour and approximately twenty hours after a nuclear explosion out to the ranges of some hundreds of kilometers from the point of burst in the case of megaton weapons. In general medium range fallout represents the most significant hazard to personnel. The effects of immediate fallout are normally overshadowed by initial radiation, blast and thermal effects in the vicinity of nuclear bursts, and the radiological dose from long range fallout does not reach tactically significant levels.

A3.1.3.3. Long range: The slow removal of very small particles which may continue for months or even years, particularly after a high yield thermo nuclear explosion. This is diffused and eventually deposited over a very large area of the earth's surface.

A3.2. Fallout Hazards. The primary operational hazard for personnel performing duties outside the shelter is alpha particles, fission fragments, and other heavy nuclei. When ingested or inhaled, these particles can do twenty times more damage to internal tissue than exposure to gamma radiation. The operational hazard for personnel remaining inside during fallout conditions is gamma ray (ionizing radiation) exposure because they penetrate the body and damage internal tissues.

A3.3. Units of Measurement. Measure gamma radiation amount or dose that a person receives in centigrays. Measure gamma ray strength or intensity in centigrays per hour. Some older radiation detection devices read intensities as roentgens per hour. The terms roentgens and centigrays are interchangeable.

A3.4. Exposure Control Guidelines.

A3.4.1. Without interfering with mission-essential military operations, avoid exposure to nuclear ionizing radiation. Since factors such as sex, age, health, and previous exposure levels influence ionizing radiation effects, no precise guidelines apply equally to everyone in all circumstances. The exposure control program effectiveness depends on knowing how much radiation personnel have been exposed to, what the effects are, and how to limit excessive exposure. For planning purposes, the total accumulated dose should not exceed 150 centigrays per person. However, the installation commander has the authority to adjust this limit, as necessary, to ensure critical mission operations. (AFI 32-4001).

A3.4.2. Include all shelterees in the exposure control system. Use RADIACs to detect and measure the dose rate. Use dosimeters to determine accumulated radiation dosages received (the ADM 300 can be used for both rate and accumulated dosages). The SMT maintains the radiological log. Enter dosages on shelter radiological logs and individual radiological dose records. General purpose worksheets may be used.

A3.4.3. When fallout is expected, conduct continuous monitoring to identify the exact arrival time of fallout radiation. Note the time and intensity on the shelter radiological log. Continue monitoring every 15 minutes until a peak in radiation intensity occurs. Note each time, intensity, and peak on the log. After peak intensity is identified, monitor and record intensity readings every 60 minutes. If an increase is noted, resume monitoring every 15 minutes until a new peak is identified. Record all readings on the shelter radiological log. Use this information to determine the actual decay rate of radiation and plan future military operations. Graphing intensities can provide a clear picture of present exposure and future decay.

A3.4.4. Place dosimeters at several locations inside the shelter and record the average reading on the shelter radiological log. Take dosimeter readings on all dosimeters in the shelter and record the average reading on the radiological log. Continue to read and average dosimeters each hour. Charge (zero) dosimeters if they have reached one-half of the maximum value, and annotate "zeroed" in the remarks column of the shelter radiological log.

A3.4.5. The SMT can determine protection factor by dividing the outside intensity reading by the inside intensity reading on gamma monitoring devices. If hot spots or higher levels of radiation are discovered at various locations inside the shelter, attempt to reduce radiation levels, or relocate personnel to safer areas in the shelter, or, if permissible, move to another shelter.

A3.4.6. Rotate shelterees through various shelter areas if radiation levels differ significantly inside the shelter. This will help equalize exposure. Keep separate records on shelterees in lieu of a radiological log for the shelter.

A3.5. Recording Individual Doses.

A3.5.1. When performing assigned tasks, many personnel are deployed outside shelters. To help ensure they do not exceed prescribed radiation dosages, each person should maintain their own radiological dose record. Each person enters their personal data and assigned shelter on the record. Personnel complete this record before they depart from, and immediately after they return to, a shelter, or

upon completing shelter operations if radiation was present. The record is designed for multiple uses before a new record is needed.

A3.5.2. Each person should complete the following items on the individual radiation dose record immediately before departing the shelter:

A3.5.2.1. Location. Enter the shelter number the person is departing from.

A3.5.2.2. Date/Time. Enter the period of time the person was in the shelter "From" the time of fallout arrival "To" the time the person departs. Then, on the next line's "From" block, enter the time and date the person departs.

A3.5.2.3. Dose. Enter the accumulated dose received while in the shelter in "This Period." Obtain this information from the shelter radiological log and supplement it with a final dosimeter reading if it has been more than 30 minutes since the last dose entry on the shelter radiological log. Enter the total accumulated dose the person has already received at the departure time in "Total Dose."

A3.5.2.4. Return Before Dosimeter Reads. Enter the maximum allowable dose that a person should not exceed while working outside. The exposure control monitor provides this number (subtract the "Total Dose" and a "Shelter Calculated Dose" from the commander's allowable dose, usually 150 centigrays). This entry lets the person know when to return to the shelter before reaching the prescribed dose. Charge (zero) and issue one dosimeter to each person or one dosimeter per group (if they will be working in the same general area). The "Shelter Calculated Dose" is an estimate based upon previous exposure levels in the shelter, multiplied by the time an individual is expected to remain in the shelter. This number will have to be continually updated as exposure levels within the shelter go down.

NOTE: If the person anticipates numerous trips outside the shelter, then the allowable dose for that person must consider the total allowable dose, minus the total exposure anticipated during each trip. That person keeps the record while outside the shelter.

A3.5.3. Each person should complete the following items on the individual radiological dose record immediately after returning to a shelter:

A3.5.3.1. Location. Enter "outside" in the location block.

A3.5.3.2. Date/Time. Enter the date and time the person returned in the "To" block.

A3.5.3.3. Dose. Enter the reading from the dosimeter carried by the person at the time of return in "This Period." Add the dose received while outside to the "Total Dose" annotated on the previous line and put the new total in "Total Dose." This will allow immediate determination of the total dose accumulated by that person.

A3.5.3.4. Each person should start a new record when he or she completely fills in the date and time, and dose entries. List the last "Total Dose" entry on the new record and retain the old record until no longer needed. All records should be turned over to medical personnel for recording in medical records.

Attachment 4

MISSION ORIENTED PROTECTIVE POSTURES (MOPP) AND AUTHORIZED VARIATIONS

A4.1. MOPP 0. Individual protective equipment is issued to personnel, inspected, prepared for use (OG should remain sealed in its vapor bag until needed), and kept readily available (accessible within 5 minutes). Carry or keep at hand protective equipment such as M8/M9 paper, nerve agent antidotes, and decontamination kits. Field gear may be worn if directed.

A4.1.1. Primary Use – Pre-Attack. Use MOPP 0 during periods of increased alert when the enemy has a CB employment capability, but CB warfare has not begun and there is no indication of its use in the immediate future.

A4.1.2. The time needed to don the equipment is about eight minutes.

A4.2. MOPP 1. The OG, mask carrier, and field gear are worn. Attach M9 tape. Ensure OG is closed. Carry or keep at hand protective equipment such as M8/M9 paper, nerve agent antidotes, and decontamination kits. Contact lenses must be removed at MOPP 1. Personnel needing vision correction must revert to glasses and the appropriate spectacle inserts for the mask worn.

A4.2.1. Primary Use – Pre-Attack. Use MOPP 1 when CB attack in theater is possible. Personnel should automatically assume MOPP 1 during Alarm Yellow unless directed otherwise.

A4.2.2. Time to achieve complete CB protection is reduced by half -- from 8 to 4 minutes. Hydration standards should be implemented.

A4.3. MOPP 2. The OG, field gear, mask carrier, and footwear covers are worn. Ensure OG is closed. Carry or keep at hand protective equipment such as M8/M9 paper, nerve agent antidotes, and decontamination kits and remaining IPE (mask/hood, gloves).

A4.3.1. Primary Use – Pre-Attack. Use MOPP 2 when CB attack in theater is probable.

A4.3.2. Mobility is reduced, but personnel can go to a higher MOPP in seconds. Hydration standards should be implemented.

A4.4. MOPP 3. All IPE items, except gloves, are worn and OG and hood openings are closed. Field gear is worn. Carry or keep at hand protective equipment such as M8/M9 paper, nerve agent antidotes, and decontamination kits and remaining IPE (gloves).

A4.4.1. Primary Use – Trans/Post-Attack. MOPP 3 has very limited application. Personnel who need increased dexterity while performing essential tasks should use MOPP 3 in areas with negligible contact hazard. MOPP 3 should not be used if liquid agent contact is possible or existing vapors will present an unacceptable percutaneous hazard.

A4.4.2. Hydration standards should be implemented.

A4.5. MOPP 4. All IPE items are worn; and OG and hood openings are closed. Field gear is worn. Carry or keep at hand protective equipment such as M8/M9 paper, nerve agent antidotes, and decontamination kits.

A4.5.1. Primary Use – Trans/Post-Attack. Automatically assume MOPP 4 when CB attack is imminent or in progress and Alarm Red is declared, or as directed. MOPP 4 is used when the highest degree of CB protection is required, when persistent chemical agents are present, or when CB agents are present and the actual hazard has not been determined.

A4.5.2. In MOPP 4, protection is complete, but efficiency will decrease rapidly. Vision and communications are restricted and there is a greater risk of heat stress. Providing personnel with enough drinking water and appropriate rest and relief periods becomes a primary concern. Hydration standards should be implemented.

A4.6. MOPP ALPHA. This MOPP configuration is designed for the BDO only. Only the mask/hood and gloves are worn. BDU sleeves are rolled down. Field gear is worn. Carry or keep at hand protective equipment such as M8/M9 paper, nerve agent antidotes, and decontamination kits and remaining IPE.

A4.6.1. Primary Use – Post-Attack. MOPP ALPHA provides flexibility for accomplishing the mission by performing mission critical tasks in a post-attack environment while wearing the mask/hood and gloves only. This level of protection is a realistic possibility only after confirmation of agent type, persistency, and actual hazard location.

A4.6.2. Likely uses of MOPP ALPHA in a CB environment may be outdoors with a downwind hazard of a negligible chemical vapor hazard agent; when biological agents are being employed; when CB agents are employed; for personnel that remain inside vehicles, buildings, or aircraft; or under nuclear fallout conditions. Hydration standards should be implemented.

A4.7. MOPP Options. In some situations, commanders may need to accept either chemical-biological or heat casualties to accomplish the mission. Therefore, the installation commander can authorize MOPP options, although they increase risk, to provide flexibility within MOPP levels and to minimize the degradation caused by wearing IPE.

A4.7.1. The choice is based on estimated casualties and recovery times from CB agent exposure, heat exhaustion, or heat stroke. Each variation imposes a greater degree of chemical risk than the basic MOPP. Factors affecting a commander's decision to use a variation include: the type of agents present or expected, temperature, work rate, immediacy of the threat, and mission needs. The standard options are:

A4.7.1.1. Mask-Only Option. Personnel protected from direct contact with chemical warfare agents in liquid/solid form, in conjunction with low to moderate vapor concentrations, need not wear the OG, footwear covers, and gloves. Instead, the mask, hood, and long sleeve duty uniform (for limited skin protection) may be worn. Interiors of buildings, vehicles, and aircraft are examples of areas where this option may be used.

A4.7.1.2. No-BDU Option. Individuals, when directed, wear the OG over underwear when heat stress is expected to be a significant factor. This allows more work to be performed, in the short term, by reducing heat burden.

A4.7.1.2.1. Since this variation increases the risk of skin contamination and the level of vapor penetration that will occur, personnel must not use it unless absolutely necessary for mission accomplishment. Furthermore the OG may be degraded by direct contact with the individual’s sweat and/or skin irritation may occur from direct contact with activated charcoal.

A4.7.1.2.2. Personnel using this variation may incur some mechanical transfer of CB contamination to their skin during CCA processing if their ensemble is liquid-contaminated.

A4.7.1.2.3. Casualty rates, depending on the agent type and the amount transferred to the skin, will increase and as personnel process into the TFA, they could bring in higher levels of contamination.

A4.7.1.2.4. This option should not be used by personnel reusing liquid-contaminated OGs.

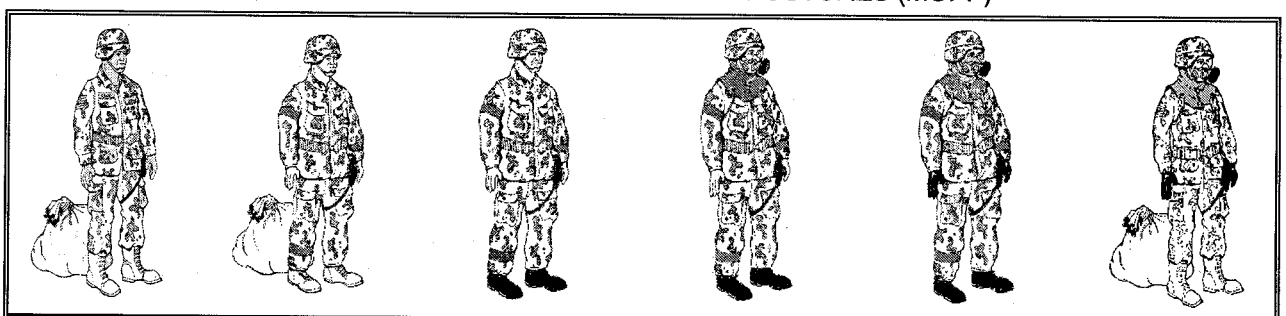
A4.7.1.3. Ventilation Option. In some cases, personnel may, with little risk, open the OG jacket to aid ventilation and reduce thermal build-up. Determining factors are the amount of warning expected before a CB attack, the type of agent(s) present, concentration of agent(s) present, and the expected persistency of the agent(s) present. The ventilation option is automatically revoked with each MOPP level increase, unless specifically reauthorized by the commander.

NOTE: Using the ventilation option involves risk because chemical vapors can be absorbed through the skin and may cause casualties over a period of time. Ventilation periods when agents are present must be limited to the minimum amount of time needed for heat relief.

A4.8. MOPP Authorization. Only the installation commander directs MOPP levels and variations. MAJCOM or Theater commander must approve modifications to MOPPs and variations.

Figure A4.1. Mission Oriented Protective Postures.

MISSION-ORIENTED PROTECTIVE POSTURES (MOPP)



MOPP LEVEL 0	MOPP LEVEL 1	MOPP LEVEL 2	MOPP LEVEL 3	MOPP LEVEL 4	MOPP LEVEL ALPHA
WORN[1]	WORN	WORN	WORN	WORN	WORN
♦ MASK CARRIER ♦ FIELD GEAR[2,3]	♦ OVERGARMENT ♦ FIELD GEAR[2] ♦ MASK CARRIER	♦ OVERGARMENT ♦ FIELD GEAR[2] ♦ MASK CARRIER ♦ FOOTWEAR COVERS	♦ OVERGARMENT ♦ FIELD GEAR[2] ♦ MASK/HOOD ♦ FOOTWEAR COVERS	♦ OVERGARMENT ♦ FOOTWEAR COVERS ♦ MASK/HOOD ♦ GLOVES ♦ FIELD GEAR[2]	♦ MASK/HOOD ♦ GLOVES ♦ FIELD GEAR[2]
AVAILABLE	CARRIED[3]	CARRIED[3]	CARRIED[3]	CARRIED[3]	CARRIED[3]
IPE ISSUED, PREPARED, AND AVAILABLE WITHIN 5 MINUTES	FOOTWEAR COVERS MASK/HOOD GLOVES	MASK/HOOD GLOVES	GLOVES		OVERGARMENT FOOTWEAR COVERS
PRIMARY USE	PRIMARY USE	PRIMARY USE	PRIMARY USE	PRIMARY USE	LIKELY USE
CB THREAT PRE-ATTACK	CB THREAT PRE-ATTACK	CB THREAT PRE-ATTACK	CB THREAT TRANS/POST ATTACK	CB THREAT TRANS/POST ATTACK	CB THREAT TRANS/POST ATTACK
– DURING PERIODS OF INCREASED ALERT WHEN ENEMY HAS CHEMICAL BIOLOGICAL EMPLOYMENT CAPABILITY BUT THERE IS NO INDICATION OF USE IN THE IMMEDIATE FUTURE.	– CHEMICAL BIOLOGICAL ATTACK IN THEATER IS POSSIBLE	– CHEMICAL BIOLOGICAL ATTACK IN THEATER IS PROBABLE	– IN AREAS WITH NEGLIGIBLE CONTACT HAZARD	– WHEN THE HIGHEST DEGREE OF CB PROTECTION IS REQUIRED – WHEN PERSISTENT CHEMICAL AGENTS ARE PRESENT – WHEN CB AGENTS ARE PRESENT; THE ACTUAL HAZARD HAS NOT BEEN DETERMINED	– UPWIND FROM A NEGLIGIBLE CHEMICAL VAPOR HAZARD AGENT. – BIOLOGICAL WARFARE AGENTS ARE BEING EMPLOYED – INSIDE VEHICLES, BUILDINGS OR AIRCRAFT – UNDER NUCLEAR FALLOUT CONDITIONS
VARIATIONS[4]: Authorized variations include: Ventilation, No BDUs, and Mask-Only.	**Ventilation - Open Overgarment:** In some cases, personnel may, with little risk, open the overgarment jacket to aid ventilation and reduce thermal build-up. **This variation is automatically revoked with each MOPP level increase, unless specifically reauthorized by the commander.** **No BDUs:** Individuals, when directed, wear the overgarment over underwear when heat stress is expected to be a significant factor				
NOTES:			**Mask-Only:** The mask, hood, and long sleeve duty uniform (for limited skin protection) may be worn.		

1. Field Gear consists of helmet, web belt, canteen, and, if issued, body armor (WORN OVER THE OVERGARMENT).
2. Carry or keep at hand protective equipment such as M8/M9 paper, Nerve agent antidotes, and decontamination kits.
3. If "All Clear, MOPP 0" is announced, web belt and canteen may be worn if desired.
4. Only the installation commander directs the MOPP levels and variations listed above. Modifications to MOPPs and variations must be approved by MAJCOM or Theater commander.

Attachment 5

MOPP ANALYSIS

A5.1. General Guidelines. MOPP analysis, based on the local tactical situation, allows the commander to balance between reducing the risk of casualties and accomplishing the mission. Risk is involved, but the better the analysis, the lower the risk and higher the performance. They can also be used for estimating personnel requirements for operations in a CB environment. When using **Attachment 8** and **Attachment 9** remember:

A5.1.1. Task time multipliers, work times, and rest times not stated in the charts can be interpolated from those stated.

A5.1.2. Individuals must consume enough water to maintain hydration standards. Commanders and supervisors should stress water consumption, because dehydration can become a serious health and performance degradation factor long before personnel become thirsty.

A5.2. Analysis Factors. Consider the following factors in MOPP analysis and update as factors change.

A5.2.1. Mission. The importance and time sensitivity of a task will dictate the degree of risk appropriate to accomplish it.

A5.2.2. Threat. Information concerning the type and degree of a CB attack threat is obtained from intelligence sources and knowing how CB agents are used. In rear areas, where most Air Force bases are located, persistent agents are more likely to be used to disrupt operations.

A5.2.3. Weather. Existing and expected weather conditions can influence the threat and type of CB attack. Also, the body cannot dissipate heat easily when temperature and humidity levels are high. The GCE makes this even harder since air movement through the garment is not adequate to evaporate enough perspiration to naturally cool the body. As body heat levels rise, the length of time personnel can sustain a given work rate decreases, and the risk of heat exhaustion and heat stroke rises.

A5.2.4. Warning. Estimate the amount of warning expected before an attack. Consider available intelligence, whether CB agents have been used in the theater, location of enemy forces, available delivery systems, and the type and deployment of detection, identification, and warning systems.

A5.2.5. Training. Well-trained personnel in good physical condition usually tolerate work and heat stress better and respond faster, more effectively, and with fewer casualties than those who are not. Hands-on experience wearing the GCE further enhances efficiency, since personnel learn how to pace themselves and work within restrictions imposed by the GCE. Personnel in both poor physical condition and little hands-on experience will be less productive than the task time multipliers given in **Attachment 8**.

A5.2.6. Work Rate. The harder personnel work, the faster they tire and accumulate body heat. Rest periods, which increase the time it takes to do a job, are needed to reduce body heat levels. Rest periods must include sufficient time under environmental conditions that promote cooling, such as shade and air movement. Little effective cooling will occur with a closed OG in air temperatures in the 90°F and above range. Heat-stressed personnel can't adequately assess their own condition--they may require close supervisory direction.

A5.2.7. Time to Accomplish Mission. Personnel in MOPPs 1 and 2 will need little additional time to do a specific task. However, at higher MOPPs, tasks will take more time because of degradation caused by protective equipment.

A5.2.8. Type and Amount of Agent. The type and amount of agent in conjunction with the locations and weather conditions will reflect the how long the personnel will remain in an Alarm Black condition. Personnel conducting post-attack reconnaissance will verify the results and relay all information to their unit control centers (UCC). The "Persist 2" chemical persistency program is the preferred program for NBC Cell personnel to use when preparing detailed chemical persistency calculations. See AFMAN 32-4017, *Civil Engineer Readiness Technician's Manual for Nuclear, Biological, and Chemical Defense* for information concerning Persist 2.

A5.3. EXAMPLE A.

A5.3.1. A tactical air reconnaissance base is in the rear area, far from enemy territory. Hostilities are imminent, and intelligence reports increased activity at enemy chemical munitions storage areas. In addition to other measures, the command alerting system directs MOPP 0. Base war planning assumes the base could be attacked with chemical agents and most likely with persistent agents. It also assumes some advance warning of an attack since the aircraft and missiles capable of delivering chemical munitions would be detected on air defense radar. Base personnel are fully trained in chemical warfare defense and are in normal physical condition. Reaction: MOPP 0 is implemented according to directed alert measures.

A5.3.2. Sometime later, hostilities begin. Intelligence reports enemy chemical agent use in the theater, but there is no enemy air or SCUD activity near the base. Reaction: The commander determines there is no immediate threat to the base and remains in All Clear and MOPP 0.

A5.3.3. Air defense reports enemy aircraft approaching the base's operational area, but it's too early to predict targets. Weather conditions are seasonal and forecast to remain so with temperatures ranging between 68°F and 82°F and humidity between 60 and 70 percent, at this time winds are blowing towards 360° at 6kts. When the air defense warning was declared, the temperature was 76°F and rising with 66 percent humidity. Reaction: The commander feels the base personnel can rapidly assume higher MOPPs and, considering the airborne threat, directs Alarm Yellow and MOPP 1. Anticipating heat degradation, the no fatigues and ventilation options are authorized. Even though the no fatigues option will increase risk during CCA processing, the commander feels the option is worth the risk. This option will allow longer working times if agents are employed that prevent using the ventilation option. The commander authorizes the mask-only option only for personnel in collective protection systems.

A5.3.4. A few minutes later, the enemy aircraft enter the base operational area and are within 12 minutes flying time from the base. Reaction: The commander directs MOPP 2 and continues the previously authorized options.

A5.3.5. Soon, radar operators report the enemy aircraft are on a direct heading for the base. Attack seems likely within four minutes. Reaction: The commander directs Alarm Red and MOPP 4. The ventilation option is automatically revoked.

A5.3.6. Enemy aircraft attack the base, then depart the area. Reports to the SRC indicate the runway, taxiways, and aircraft shelters were heavily hit with conventional munitions. Some of the aircraft dropped bombs exploded with a muted sound several hundred feet above the ground. Automatic

detectors have alarmed, M8 paper indicates G-type liquid nerve agents, and several casualties have nerve agent symptoms. Reaction: The commander directs Alarm Black and continues in MOPP 4. The ventilation option continues to be withheld until the situation clarifies.

A5.3.7. Chemical monitoring confirms only GB-type nerve agent was used. Weather conditions have changed little. Base recovery and sortie generation is a high priority. Enemy air activity continues in the theater, but not in the base's operational area. Based on a temperature of 20C and 6KT winds the NBC Cell personnel calculated the persistency of the agent to be 1.75 hours. The Chief of Maintenance requests MOPP 3 for a small group of electronics specialists who cannot perform an indoor repair wearing gloves. Reaction: The commander approves MOPP 3 for the Chief of Maintenance. MOPP 4 is continued for everyone else. The no fatigues option continues in effect. Nerve agent GD is absorbed by the skin with cumulative effects. However, the ventilation option is authorized with the reservation it only be used when heat stress prevents essential task completion and then only for the time necessary to obtain heat relief.

A5.3.8. After two hours monitoring showed that the chemical warfare agents have dispersed naturally. Selective unmasking directed by the commander results in no symptoms. There is no immediate threat of another attack. Reaction: The commander directs All Clear and MOPP 0 for personnel outdoors.

A5.4. EXAMPLE B.

A5.4.1. A mobile communications unit without collective protection systems is operating near the forward line of troops. Hostilities are likely, and intelligence reports increased activity at enemy chemical munitions storage areas. Among other measures, the command alerting system directs MOPP 0. Reaction: The commander assumes the unit could be attacked with chemical agents and most likely with nonpersistent agents since it is in the expected line of enemy advance. Little or no advance warning of an attack is expected because the unit is within artillery and rocket range. MOPP 0 is directed.

A5.4.2. Later, hostilities are imminent. Intelligence predicts an initial enemy thrust through the unit's area and feels chemical agents will be used. Daily high temperatures are 48°F and drop to 36°F at night. The forecast calls for calm winds and a constant neutral or inversion temperature gradient. The command alerting system recommends Alarm Yellow. Reaction: Considering the intelligence estimate and because the weather conditions favor a chemical agent attack, the unit commander directs Alarm Yellow and MOPP 2. The ventilation option is also authorized. The no fatigues option is not used. Since the expected threat is nonpersistent agents, the period of degraded operations will be relatively short and the ventilation option may be possible during the period contamination is present.

A5.4.3. Hostilities soon begin, and the unit is hit with an intense barrage of rocket fire. The rockets burst upon impact with low flash and muffled explosions. Reaction: The commander directs Alarm Red and MOPP 4 within seconds of the barrage's beginning. The ventilation option was automatically revoked.

A5.4.4. The barrage lifts after five minutes. There is little damage from blast and shrapnel. Reaction: The unit commander, suspecting a chemical agent attack, directs Alarm Black, and continues MOPP 4. The ventilation option continues to be withheld until the situation clarifies. Chemical monitors begin testing for agents.

A5.4.5. A few people reported smelling almonds as they put on their masks at the beginning of the attack. A few casualties of the attack died without apparent wounds. The chemical monitors report a negative on all tests. The commander directs selective unmasking. Reaction: Based on type of attack, symptoms, and the almond odor, the commander assumes the unit was attacked with hydrogen cyanide which almost immediately dissipated to subdetection levels. Still subject to attack, Alarm Yellow and MOPP 2 with the ventilation option is directed.

Attachment 6

EMERGENCY PERSONAL RELIEF PROCEDURES

A6.1. Personnel should relieve themselves before departing a TFA into a contaminated environment. Work and heat stress will automatically minimize urine formation. Therefore, do not limit the intake of liquids to minimize urine formation. **NOTE:** Personnel should try to avoid relieving themselves in a contaminated environment if at all possible. Blister agent vapors can harm exposed skin.

A6.2. Personnel can relieve themselves in a contaminated environment using the procedures below. Avoid contaminating exposed skin and clothing worn under the OG. If absolutely necessary, personnel can relieve themselves inside the OG and change it as soon as possible.

A6.2.1. Step 1. Select a toilet or other suitable area. **NOTE:** Personnel may use toilets located in a facility protected from liquid agent contamination. Squat above, rather than sit on, the toilet fixture to help avoid contamination transfer. Use a "cathole" (for depositing and burying body wastes) only if a toilet is not available.

A6.2.2. Step 2. Decontaminate your gloves with a decontamination kit.

A6.2.3. Step 3. Unsnap back snaps (CPO has no snaps, only the retention cord) and pull up your OG jacket by the bottom, folding it back on itself once, enough to open your OG pants.

A6.2.4. Step 4. Decontaminate your gloves again, if necessary.

A6.2.5. Step 5. Unsnap and unzip your OG pants, and carefully peel them down as far as necessary.

A6.2.6. Step 6. Carefully remove your rubber gloves and inserts and set them nearby. Do not touch contaminated objects with your unprotected hands.

A6.2.7. Step 7. Open and lower your underclothing, as necessary, and relieve yourself.

A6.2.8. Step 8. Pull up your underclothing.

A6.2.9. Step 9. Put your gloves and inserts back on without touching the outside of the gloves, which may be contaminated.

A6.2.10. Step 10. Pull up your OG pants and refasten them.

A6.2.11. Step 11. Pull your OG jacket down and refasten it.

A6.2.12. Step 12. Fill and pack down the cathole, if used.

Attachment 7

CBWD COLD WEATHER OPERATIONS

A7.1. Introduction. Commanders should not consider cold conditions a deterrent to CW agent use. Agent physical properties are affected by temperature, but the effectiveness is not always degraded when used at very low temperatures. They can create an appreciable vapor and aerosol hazard.

A7.1.1. Operations in the cold present health and survival challenges. It is critical to be able to recognize the threats, implement preventive measures, recognize the symptoms of cold injury and take corrective actions. Proper training before deploying into cold-weather regions is more important for prevention of cold injuries than repeatedly being exposed to cold temperatures. Humans do not acclimatize to cold weather nearly as well as they can acclimatize to hot weather, although repeated cold exposure does produce what is referred to as habituation. With habituation to repeated cold exposure, humans adjust mentally and emotionally.

A7.1.2. While cold makes military tasks more difficult, it does not make them impossible. Viewing cold as a challenge to be overcome is the key to the positive attitude required to successfully complete the mission.

A7.2. Behavior of Chemical Agents. The major threat from the employment of chemical warfare weapons in cold regions is the delayed action. Some nerve and blister agents are almost inactive, especially in terms of presenting a vapor hazard, at 32°F. The danger is created when nerve and blister agents are carried into heated shelters on clothing, footgear, or other equipment. The warmth of the shelter will reactivate these agents creating a chemical vapor and/or a liquid hazard in the enclosed area.

A7.2.1. Blister Agents. Normally, blister agents such as distilled mustard (HD) are non-effective at low temperatures due to their high freezing points. However, if blister agents are encountered, care should be taken to avoid bringing contaminated clothing into heated shelters; the frozen agent will melt, thus increasing its effectiveness. As exceptions there are blister agents with low freezing points; and encountering a blister agent at low temperatures is a possibility that should be considered.

A7.2.2. Nerve Agents. Although the nerve agent GB has a low freezing point (-56°C), its effectiveness in subzero weather is reduced due to difficulty in disseminating it as an aerosol. It should be noted, however, that if G-series nerve agents are encountered, their persistency will be increased, giving longer exposure to lower concentrations. Nerve agent VX is reduced in effectiveness due to the fact that absorption of agents through the skin is reduced by the layered clothing worn in cold regions.

A7.2.3. Other Chemical Agents. The solid, riot control agents that are dispersed by burning type munitions will function in low temperatures. Considerations of employment should include the fact that the burning munitions will sink into the snow and that the agent is very persistent at low temperatures.

A7.3. Equipment.

A7.3.1. Protective Masks. In extremely cold temperatures (-20°F and below), the mask becomes very rigid and is difficult to don. When donned at these temperatures, the protective mask causes instantaneous frostbite on the individuals face. To prevent this cold weather injury, the mask must be carried under outergarments to remain relatively warm from the individuals body heat. Also, in

extreme cold, the mask eye lenses immediately fog and freezes when the mask is donned. In addition, breath condensation freezes the valves and the voicemitter assembly. This section contains specific instructions for cold-weather use of the mask. These instructions are essential for the proper functioning of this piece of equipment.

A7.3.1.1. Donning the Mask:

A7.3.1.1.1. Hold breath.

A7.3.1.1.2. Lower parka hood.

A7.3.1.1.3. Don the mask and hood. DO NOT CLEAR THE MASK by exhaling a large volume of air into the mask; the moist air will frost the cold lens. Exhale slowly and lightly. (NOTE: This is a deviation from normal warm weather procedure.)

A7.3.1.1.4. If the outlet valve sticks to the valve seat, perform the following:

A7.3.1.1.4.1. Lift the outlet cover.

A7.3.1.1.4.2. Massage the outlet valve disk with one finger DURING EXHALATIONS ONLY, or until the disk functions without sticking to the valve seat (with or without cold weather gloves).

A7.3.1.1.4.3. Reseat the outlet valve cover.

A7.3.1.1.4.4. Check the mask for leaks by covering inlet valves with hands.

A7.3.1.2. Removing Mask. If the wearer becomes overheated in extremely cold weather, the mask with attached hood should not be removed outdoors until the face and head have cooled and an "all clear" has been announced. A cooling-off period is not required if the mask and hood are removed in a warm room or outdoors at mild temperatures. If contamination is suspected, removal procedures are to be accomplished in accordance with approved contamination control area donning/doffing instructions.

A7.3.1.3. General Procedures.

A7.3.1.3.1. The mask should be inspected after use for icing and cracks in the intake and outlet valves.

A7.3.1.3.2. The metal rivets on the inside of the mask should be covered with small pieces of tape to prevent frost bite.

A7.3.1.3.3. During intervals between repeated use of the mask, remove the mask from the carrier. Flex or jar the mask sufficiently to remove ice and snow from all its components and accessories.

A7.3.1.3.4. Warm the mask whenever the opportunity permits.

A7.3.1.3.5. When indoors or in a warm location, remove the mask from its carrier and wipe it dry with a cloth. Be sure that the outlet valve and nosecup valves are dry. Remove any foreign matter retained in the mask after wiping it. Replace the mask in the carrier.

A7.3.2. Nerve Agent Antidote/Atropine. These items have to be kept as close to body temperature as possible to prevent the freezing of the antidote/atropine and reduce danger of muscle shock/spasms from injecting an extremely cold liquid into the muscle. Atropine freezes at approximately the same

temperature as water. Whenever the temperature is below 40° F the atropine should be carried in one of your shirt pockets. Atropine that has been allowed to freeze is usable when thawed.

A7.3.3. Cold Weather Clothing. In some chemical warfare threat areas, cold weather clothing is worn over the CWD ensemble. Be careful not to overheat while wearing the OG and cold weather parka, as hypothermia is a possibility. If threat analysis indicates a chemical attack could occur, there are several considerations that should be analyzed to determine procedural guidance:

A7.3.3.1. The basis of issue (BOI) for cold weather clothing is normally one item per person in or deployable to the appropriate environment. Commanders should consider the threat, the contamination potential, and need for additional cold weather clothing. If stocks are not adequate to support mission requirements, they should request BOI adjustments for their specific needs. Joint support planning documents should call out specific requirements above current allowances for deployable forces.

A7.3.3.2. Cold weather clothing not in use by shelterees could be stockpiled and used as replacements for contaminated garments.

A7.3.3.3. Cold weather clothing wear should enhance the CWD ensemble ability to protect the wearer by acting as a buffer zone against agent penetration effects.

A7.3.4. Chemical Protective Boots. The white arctic vapor barrier boot (NSN 8430-00-655-5563) worn in extreme cold provides protection from chemical agents. However, mukluks do not provide chemical protection due to their permeability; therefore, chemical protective overboots should be worn over the mukluk, or over the standard combat boots.

A7.4. Cold Weather Detection/Decontamination Procedures. Most equipment items have cold weather operation procedures listed in their respective technical orders (T.O.).

A7.4.1. M256A1 Chemical Agent Detector Kit. At subfreezing temperatures, the kit's effectiveness deteriorates rapidly. Below 15° F, the kit is no longer dependable to provide accurate results due to the various capsule solutions freezing. It is imperative that the detector kit be kept close to the body to remain relatively warm.

A7.4.2. Concentrating Chemical Agent Vapors. Nerve agent VX is not very volatile, particularly at low temperatures. It is possible that liquid contamination may be present with no detectable vapors. To test a suspected area of contamination, either warm the area before testing and/or concentrate the vapors using a small box or can. Use of the box or can is described below:

A7.4.2.1. Place a small can or box over a portion of the suspected area for about 5 minutes.

A7.4.2.2. Punch a hole in the can or box. Place the detector ticket directly over the hole and sample. Do not allow the detector ticket to touch the contaminant by stopping air currents from carrying the vapors away.

A7.4.3. Automatic Liquid Agent Detector System (ALAD). When the ALAD is connected to AC power, a heater in the sensor mounting plate provides heat to the sensor when the temperature is below 70° F. The Built-In-Test (BIT) feature shelf checks the detector unit. The colder the temperature is, the longer is takes before the heater is checked, and the lamp goes out to indicate BIT OK.

A7.4.4. M258A1 Skin Decontamination Kits. Precautions must be taken to prevent frostbite when applying the towelette solutions to the skin. See T.O. 11D1-1-111.

A7.4.5. M17 Lightweight Decontamination Apparatus. Procedures for using the water filled LDA during cold weather will be according to T.O. 11D1-3-9-1.

A7.4.6. Following contamination control area processing, liquid contaminated cold weather clothing is decontaminated, disposed of, or replaced as specified in T.O. 11C15-1-3. Aeration (similar to those procedures used for the CWD ensemble) could be used. As long as the liquid contamination has not penetrated through the cold weather gear, it should not present a hazard if worn over the CWD ensemble. If liquid contamination has penetrated through the cold weather gear, reuse could hasten penetration through the CWD ensemble.

A7.5. Cold Injuries. When a person is surrounded by air or water having a lower temperature than body temperature, the body will lose heat, since heat flows from places with high temperature to those with lower temperature. The colder the surrounding temperature, the greater the potential for body heat to escape. If heat escapes faster than the body produces heat, body temperature will fall. Normal body temperature is 98.6^{o}F, and if body temperature falls much below this, performance degrades and cold injuries can result.

A7.5.1. Humans protect themselves from cold primarily by avoiding or reducing cold exposure using clothing and shelter. When this protection proves inadequate, the body has biological defense mechanisms to help maintain correct body temperature. The body's internal mechanisms to defend its temperature during cold exposure include vasoconstriction (tightening of blood vessels in the skin) and shivering. When these responses are triggered, it is a signal that clothing and shelter are inadequate.

A7.5.1.1. The reduced skin blood flow due to vasoconstriction conserves body heat, but can lead to discomfort, numbness, loss of dexterity in hands and fingers, and eventually cold injuries. When cold exposure lasts for more than an hour, cooling of the skin and reduced blood flow to the hands leads to blunted sensations of touch and pain and loss of dexterity and agility. This can impair ability to perform manual tasks and lead to more severe cold injuries, since symptoms may go unnoticed. Feet are particularly vulnerable, and extra foot care is required for cold-weather operations.

A7.5.1.2. Shivering increases internal heat production, which helps to offset the heat being lost. Internal heat production is also increased by physical activity, and the more vigorous the activity, the greater the heat production. In fact, heat production during intense exercise or strenuous work is usually sufficient to completely compensate for heat loss, even when it is extremely cold. However, high intensity exercise and hard physical work are fatiguing, can cause sweating, and cannot be sustained indefinitely. Moreover, most military occupational activities are less vigorous than high-intensity exercise, so internal heat production will probably not be adequate to offset heat loss.

A7.5.2. Types of cold injuries. Cold injuries are generally categorized as either nonfreezing or freezing injuries.

A7.5.2.1. Common nonfreezing cold injuries can occur when conditions are cold and wet (air temperatures between 32°F and 55°F) and the hands and feet cannot be kept warm and dry. The most prominent nonfreezing cold injuries are chilblain and trenchfoot. **Table A7.1.** provides first-aid procedures. Furthermore, another non-freezing injury, hypothermia, is a life-threatening condition in which deep-body temperature falls below 95°F.

A7.5.2.1.1. Chilblain is a nonfreezing cold injury which, while painful, causes little or no permanent impairment. It appears as red, swollen skin which is tender, hot to the touch, and may itch. This can worsen to an aching, prickly ("pins and needles") sensation, and then numbness. It can develop in only a few hours in skin exposed to cold.

A7.5.2.1.2. Trenchfoot is a very serious nonfreezing cold injury which develops when skin of the feet is exposed to moisture and cold for prolonged periods (12 hours or longer). The combination of cold and moisture softens skin, causing tissue loss and, often, infection. If treatment is delayed, amputation may become necessary. Often, the first sign of trenchfoot is itching, numbness, or tingling pain. Later the feet may appear swollen, and the skin mildly red, blue, or black. Commonly, trenchfoot shows a distinct "water-line" coinciding with the water level in the boot. Red or bluish blotches appear on the skin, sometimes with open weeping or bleeding. The risk of this potentially crippling injury is high during wet weather or when personnel are deployed in wet areas. Airmen wearing rubberized or tight-fitting boots are at risk for trenchfoot regardless of weather conditions, since sweat accumulates inside these boots and keeps the feet wet.

Table A7.1. First Aid for Chilblain and Trenchfoot.

	FIRST AID FOR CHILBLAIN AND TRENCHFOOT:
1.	Prevent further exposure.
2.	Remove wet, constrictive clothing.
3.	Wash and dry injured area gently.
4.	Elevate injured area, cover with layers of loose, warm clothing, and allow to rewarm (pain and blisters may develop).
5.	Do not: pop blisters, apply lotions or creams, massage, expose to extreme heat, or allow victim to walk on injury.
6.	Refer for medical treatment.

A7.5.2.1.3. Hypothermia is a medical emergency; untreated, it results in death. Hypothermia occurs when the body's cold-defense mechanisms cannot keep up with the demand for heat. Because water has a tremendous capacity to drain heat from the body, immersion in water considered even slightly cool (e.g., 60°F) can cause hypothermia, if the immersion is prolonged for several hours. Generally, deep-body temperature will not fall until after many hours of continuous exposure to cold air, if the individual is healthy, physically active, and reasonably dressed. However, since wet skin and wind accelerate body heat loss, and the body produces less heat during inactive periods, body temperature can fall even when air temperatures are above freezing if conditions are windy, clothing is wet, and/or the individual is inactive.

A7.5.2.1.3.1. Hypothermia may be difficult to recognize in its early stages of development. Things to watch for include unusually withdrawn or bizarre behavior, irritability, confusion, slowed or slurred speech, altered vision, uncoordinated movements, and unconsciousness. Even mild hypothermia can cause victims to make poor decisions or act drunk (e.g., removing clothing when it is clearly inappropriate).

A7.5.2.1.3.2. Hypothermia victims may show no heartbeat, breathing, or response to touch or pain, when in fact they are still alive. If hypothermia has resulted from submersion in cold water, cardiopulmonary resuscitation (CPR) should be started without delay. However, when hypothermia victims are found on land, it is important to take a little extra time checking for vital signs to determine whether CPR is really required. Hypothermia

victims should be treated as gently as possible during treatment and evacuation, since the function of the heart can be seriously impaired in hypothermia victims. Rough handling can cause life-threatening disruptions in heart rate. All hypothermia victims, even those who do not appear to be alive, must be evaluated by medical personnel. See **Table A7.2.** for first aid procedures for hypothermia.

Table A7.2. First Aid For Hypothermia.

FIRST AID FOR HYPOTHERMIA: 1. Prevent further cold exposure. 2. Remove wet clothing. 3. Initiate CPR, only if required. 4. Rewarm by covering with blankets, sleeping bags, and with body-to-body contact. 5. Handle gently during treatment and evacuation. 6. Refer for medical treatment immediately.

A7.5.2.2. Freezing cold injuries can occur whenever air temperature is below freezing (32°F).

A7.5.2.2.1. Frostnip involves freezing of water on the skin surface. The skin will become reddened and possibly swollen. Although painful, there is usually no further damage after rewarming. Repeated frostnip in the same spot can dry the skin, causing it to crack and become very sensitive. Frostnip should be taken seriously, since it may be the first sign of impending frostbite.

A7.5.2.2.2. Frostbite. When freezing extends deeper through the skin and flesh, the injury is frostbite. Skin freezes at about 28°F. As frostbite develops, skin will become numb and turn to a gray or waxy-white color. The area will be cold to the touch and may feel stiff or woody. With frostbite, ice crystal formation and lack of blood flow to the frozen area damages the tissues. After thawing, swelling may occur, worsening the injury. Severely affected areas (often toes and fingers) may require amputation. See **Table A7.3.** for first aid procedures for frostbite.

Table A7.3. First Aid For Frostbite.

FIRST AID FOR FROSTBITE (AND FROSTNIP, AS NEEDED): 1. Prevent further exposure. 2. Remove wet, constrictive clothing. 3. Rewarm gradually by direct skin-to-skin contact between the injured area and noninjured skin of the victim or a buddy. 4. Evacuate for medical treatment (foot injuries by litter whenever possible). 5. Do not: allow injury to refreeze during evacuation, rewarm a frostbite injury if it could refreeze during evacuation, rewarm frostbitten feet if victim must walk for medical treatment, rewarm injury over open flame.

A7.5.3. Risk factors. Susceptibility to cold injury (non-freezing, freezing or hypothermia) is affected by many factors.

A7.5.3.1. Poorly conditioned individuals are more susceptible to cold injury. They tire more quickly and are unable to stay active to keep warm as long as those who are fit.

A7.5.3.2. Dehydration. The body's requirement for water is high during cold-weather. Even in cold weather, sweating due to heavy work and clothing can contribute to body water losses. In

cold, dry conditions, sweat may evaporate readily without the individual sensing it. Unless water intake exceeds body water losses, dehydration will result.

A7.5.3.3. Low body fat. Body fat is an excellent insulator against heat loss. Therefore, a very lean person may be more susceptible to the effects of cold, if clothing is inadequate or wet and/or the individual is relatively inactive such as during guard duty.

A7.5.3.4. Alcohol, and to a lesser extent caffeine, cause the blood vessels in the skin to dilate which may accelerate body heat loss. Also, alcohol and caffeine increase urine formation, leading to dehydration, which can further degrade the body's defenses against cold. More importantly, alcohol blunts the senses and impairs judgment, so the individual may not feel the signs and symptoms of developing cold injury. Nicotine decreases blood flow to the skin, and therefore smoking or chewing tobacco can increase susceptibility to frostbite.

A7.5.3.5. Inadequate nutrition compromises the body's responses to cold. More energy is expended during cold weather, due to wearing heavy cold-weather gear and the increased effort required for working or walking in snow. In addition, the body uses more calories keeping itself warm when the weather is cold, which also contributes to the increased energy requirement.

A7.5.3.6. Inactivity. Duties where individuals remain relatively inactive (or movement is restricted) for prolonged periods can increase the risk of cold injury. Sick, injured, and wounded individuals are very susceptible to cold injuries.

A7.5.4. Wind. For any given air temperature, wind increases the potential for body-heat loss, skin cooling, and decreased internal body temperature. Wind increases heat loss from skin exposed to cold air, in effect lowering the temperature. The wind-chill index integrates windspeed and air temperature to provide an estimate of the cooling power of the environment and the associated risk of cold injury. The wind-chill is the equivalent still-air (i.e., no wind) temperature at which the heat loss through bare skin would be the same as under the windy conditions.

A7.5.4.1. Table A7.4. depicts the Equivalent Chill Temperature for wind speeds and air temperatures. To find the equivalent chill temperature in the table, find the row corresponding to the wind speed, and read across until reaching the column corresponding to the air temperature.

A7.5.4.2. Wind-chill temperatures obtained from weather reports do not take into account "man-made" wind (e.g., riding in an open vehicle, propeller/rotor-generated wind). Man-made winds worsen the wind-chill effect of natural wind. Individuals can be subject to dangerous wind-chill, even when natural winds are low.

Table A7.4. Wind Chill Chart 1,2

WIND SPEED (IN MPH)	ACTUAL TEMPERATURE (°F) 50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	EQUIVALENT CHILL TEMPERATURE											
CALM	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	3	-9	-21	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	15	0	-15	-29	-44	-59	-74	-89	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-22	-37	-53	-69	-85	-101	-117	-132	-148
(WIND SPEEDS GREATER THAN 40 MPH HAVE LITTLE ADDITIONAL EFFECT)	LITTLE DANGER (In less than 5 hrs with dry skin. Greatest hazard from false sense of security.)				INCREASING DANGER (Exposed flesh may freeze within 1 minute.)			GREAT DANGER (Exposed flesh may freeze within 30 seconds.)				

*To determine the windchill temperature, enter the chart at the row corresponding to the windspeed and read right until reaching the column corresponding to the actual air temperature.

[2]Source: US Army Research Institute of Environmental Medicine, Natick, Massachusetts.

A7.5.5. When assessing weather conditions for personnel operating in mountainous regions or for flight personnel in aircraft, altitude may need to be considered if weather measurements are obtained from stations at low elevations. Temperatures, wind-chills, and the risk of cold injury at high altitudes can differ considerably from those at low elevations. In general, it can be assumed that air temperature is 3.6°F lower with every 1000 feet above the site at which temperature was measured.

A7.5.6. Metal objects, liquid fuels, and solvents that have been left outdoors in the cold can pose a serious hazard. Both can conduct heat away from the skin very rapidly. Fuels and solvents remain liquid at very low temperatures. Skin contact with fuel, solvents or metal at below freezing temperatures can result in nearly instantaneous freezing. Fuel handlers should use great care not to allow exposed skin to come into contact with spilled fuel or the metal nozzles and valves of fuel delivery systems.

A7.5.7. Prevention of Cold Injuries. Shelter from the elements is secondary only to defending against enemy actions.

A7.5.7.1. Personnel should be allowed to seek relief periodically from potentially dangerous cold stress situations (extreme cold; wind-chill; wet cold) by taking breaks in sheltered or heated areas, consuming warm beverages and hot food, and replacing wet clothing with dry clothing.

A7.5.7.2. When outdoors, keep personnel busy and physically active. Plan carefully to avoid unnecessary periods where personnel are left standing in the open.

A7.5.7.3. Be prepared for sudden weather changes.

A7.5.7.4. Use a buddy system and frequent self-checks, especially when individuals are performing sedentary or low intensity tasks, or duties require removal of gloves.

A7.5.7.5. Eat more food than normal. Caloric intake requirements will be 25 to 50% higher during cold-weather operations than in warm or hot weather.

A7.5.7.6. Prevent Dehydration. Thirst alone is not a good indicator of adequate fluid intake. Personnel must be taught to consume liquids even when they are not thirsty. The optimum amount of water needed to prevent dehydration for any individual can not be predicted precisely due to individual physiology, climate, and physical activity, but there are "rule of thumb" guidelines for planning daily water consumption and supply needs in cold environments.

A7.5.7.6.1. All water (and ice cubes) consumed must be from a medically approved source to prevent waterborne illnesses. Individuals should carry as much water as possible when separated from medically approved water sources. Snow and ice may be melted to use as drinking water in emergencies, but it must be disinfected before consumption.

A7.5.7.6.2. Plain water is the beverage of choice, and personnel will be more likely to drink sufficient water if it is palatable. Whenever possible, provide cool (60-70 ^{o}F) water.

A7.5.7.6.3. It is much better to drink small amounts of water frequently than to drink large amounts occasionally. A general recommendation for personnel in cold-weather operations is to consume about four canteens (four quarts) of water each day if sedentary, and at lease five to six canteens (five to six quarts) of water each day if active.

A7.5.7.7. Cold-weather clothing protection is based on the principles of insulation, layering, and ventilation. By understanding these principles, personnel can vary their clothing to regulate protection and stay comfortable.

A7.5.7.7.1. Wearing clothing in multiple layers allows the wearer to remove or add clothes to adjust the insulation to changes in environment or workload as well as to the individual's own needs and preferences.

A7.5.7.7.2. Feet, hands, and exposed skin must be kept dry. Feet are particularly vulnerable, and extra foot care is required for cold-weather operations. Whenever possible, socks should be changed when they become wet from rain, snow, or sweat and the feet dusted with antifungal powder (NSN 6505-01-008-3054).

A7.5.7.7.3. Table A.7.5 "Guidance for Cold Weather," provides general guidance for daily operations and training in cold weather.

Table A7.5. Guidance 1,2 for Cold Weather.

GUIDANCE FOR COLD WEATHER			
	Windchill Category (See Table A7.4. for Danger Category Criteria)		
Work Intensity (with examples)	**Little Danger**	**Increased Danger**	**Great Danger**
High: (Pick and shovel work; rapid runway repair; heavy aircraft repair; armament crew; running	Increase supervisory surveillance; gloves mandatory below 0×f; increase hydration.	Wear garments rated for temperature (see "AS 016"3); mittens with liners; skin covered and kept dry; rest in warm, sheltered area.	Essential tasks only with <15 minute exposure; work groups of no less than 2; wear garments rated for temperature (see "AS 016"3), mittens with liners; skin covered and kept dry; rest in warm, sheltered area.
Low/moderate: (Light to moderate lifting and pushing; refueling; aircraft maintenance; NBC reconnaissance teams; walking).	Increase supervisory surveillance; cover exposed skin; mittens with liner below 10×F; full head cover below 0×F; keep skin dry, especially around nose and mouth.	When mission permits, curtail non-essential tasks; 30-40 minute work cycles with frequent supervisory surveillance; see above.	High risk of cold injury; when mission permits, cancel outdoor exposure.
Sedentary: (light hand or arm work; clerical work; carrying little or no load; driving vehicle; guard duty; eating; resting).	See above; keep sking dry, especially around nose and mouth; cold weather boots below 0×F; shorten duty cycles; provide warming facilities.	When mission permits, curtail non-essential tasks, 15-20 minute work cycles with frequent supervisory surveillance; work groups of no less than 2; see above.	Highest risk of cold injury; when mission permits, cancel outdoor exposure.
1Based on Appendix B of US Army Research Institute of Environmental Medicine: Sustaining Health & Performance in the Cold. USARIEM Technical Note 93-2, Dec 92.			
2Commanders of units with extensive experience in extreme cold weather and specialized equipment may opt to use less conservative guidelines.			
3Allowance Standard 016, "Special Purpose Clothing and Personal Equipment."			

Attachment 8

MOPP 3 AND 4 TASK TIME MULTIPLIER

Table A8.1. Task Time Multiplier.

WORK RATE	ACTIVITY EXAMPLES	20× - 49× -7× - -9× C	50× - 84× F 10× -28× C	85× - 100× F 29 -38 C
LIGHT	Tower Operators Operations Officers Pilot Ground Activities Command Post Activities	1.2	1.4	1.5
MODERATE	Refueling Avionics Shop Aircraft Maintenance NBC Reconnaisance Team	1.3	1.4	3.0
HEAVY	Armament Crew Rapid Runway Repair Heavy Aircraft Repair	1.7	2.1	5.0

A8.1. To estimate how much time it will take to perform a task or operation while in MOPPs 3 and 4:
A8.1.1. Determine the appropriate column for the outside temperature.
A8.1.2. Find the work rate using the activity examples as a guide (e.g. light, moderate, and heavy).
A8.1.3. Find the task time multiplier by reading across the work rate line and down the temperature column.

A8.1.4. Example: A rapid runway repair team is working while the outside temperature is 60° F. The task normally takes 2½ hours to complete. By using the chart, rapid runway repair is listed as a heavy work rate under the activities examples. Also, by using the outside temperature (60 F) for that work rate (heavy), the task time multiplier can be found. In this case, the task time multiplier is 2.1. Take the task time multiplier and multiply it by the time it normally takes to do the job (2.1 x 2 ½ hours = 5.25 hours). Therefore, the time it takes to do the job in MOPP 4 is 5 ¼ hours

Attachment 9

SUSTAINING HEALTH AND PERFORMANCE IN A HOT ENVIRONMENT

A9.1. Introduction. Operating in a hot environment degrades physical performance and places personnel at risk for heat illnesses. Successfully functioning in a hot environment depends on understanding the factors contributing to heat stress, knowing and implementing the preventive measures, and maintaining constant observation of personnel for risk factors and signs of heat illness.

A9.2. Common Heat Illnesses.

A9.2.1. Heat rash ("prickly heat") is a skin rash most commonly found when there is unrelieved exposure to humid heat and the skin stays wet continuously with unevaporated sweat. Heat rash can be avoided by keeping skin clean and allowing it to dry between heat exposures.

A9.2.2. Sunburn. Sunburn is painful and can impair body heat loss by reducing the ability to sweat, degrading performance and increasing the risk of heat casualties.

A9.2.3. Heat syncope. Fainting while standing erect and immobile in heat, caused by pooling of the blood in dilated vessels and the lower parts of the body. Lack of acclimatization is a predisposing factor.

A9.2.4. Heat cramps are painful muscle spasms primarily in the abdomen, legs, and arms, due to excessive salt and water losses. Heat cramps most often occur in individuals who are not acclimatized to the heat. Heat cramps can be avoided by acclimatization, and maintaining proper nutrition and hydration.

A9.2.5. Heat exhaustion occurs during work in the heat and appears as marked fatigue and weakness, nausea, dizziness, fainting, vomiting, elevated body temperature, and mild changes in mental function (e.g., disorientation, irritability). Heat exhaustion is caused by lack of acclimatization, and failure to replace water and/or salt lost in sweat. Heat exhaustion can be avoided by allowing workers to acclimatize, supplementing dietary salt only during acclimatization, and drinking ample water frequently throughout the work day.

A9.2.6. Heat stroke is a **medical emergency** caused when the body stops sweating, leading to loss of evaporative cooling and a dangerous rise in core temperature. It can include all of the signs and symptoms of heat exhaustion, but is more severe and can be fatal. The victim is usually disoriented or unconscious. One heat casualty is usually followed by others.

A9.3. Risk Factors.

A9.3.1. Dehydration. Following the loss of sweat, water must be consumed to replace the body's loss of fluids. If the body fluid lost through sweating is not replaced, dehydration will follow. Under extreme conditions, maximum sweat rates can actually exceed the body's ability to absorb fluids. Whenever consumption of water fails to keep up with output of sweat, the body will become progressively dehydrated. Other factors that can contribute to dehydration are consumption of alcohol and caffeine, which increase urination, and excessive consumption of salt. Thirst is a poor indicator of dehydration. Dehydration is possible without any signs of thirst; mental and physical performance can degrade so slowly that individuals may not recognize the problem in themselves or others. Dehydration cancels the benefits of heat acclimatization, increases the risk of heat illness, reduces work

capacity, appetite, and alertness, and increases susceptibility to other medical problems such as constipation, kidney disorders, and urinary tract infections.

A9.3.2. IPE. IPE (and other protective garments that prevent the transfer of air and moisture) restrict normal heat loss mechanisms because of their high insulation and low permeability to water vapor. These effects occur even when ambient temperature and humidity are relatively low. Physical work tasks require more time and effort when these are worn because of added weight and restricted movement. This results in more body heat to be dissipated than normal. Variations to MOPP levels, such as opening or removing the jacket, will reduce barriers to body cooling. Therefore, commanders must conduct risk analyses to balance performing mission critical tasks, casualties due to actual NBC threat, and degraded performance due to heat stress, dehydration, and bulkiness of the protective equipment.

A9.3.3. Salt depletion. Failure to replace salt lost in sweat can lead to several heat illnesses. Salt depletion occurs when personnel are sweating heavily (especially before they acclimatize), and drinking large volumes of water without replacing salt loss. In most cases, sufficient salt can be consumed in the daily diet. If meals are skipped, or food intake is reduced considerably, salt intake may be inadequate. On the other hand, excessive salt in the diet can lead to dehydration.

A9.3.4. Lack of acclimatization. Unacclimatized personnel are those who have not built up a tolerance for working in a hot environment. The personnel most likely to be affected by the heat are those who have just arrived from cooler climates, and persons who are not in shape. They will experience degraded mental and physical performance and be highly susceptible to heat illness.

A9.3.5. Failure to observe work-rest cycles. Even in acclimated individuals, body temperatures can rise very rapidly due to the combination of excessive heat and sustained activity. To prevent a dangerous increase in body temperature, heat production must be minimized by reducing work pace and increasing rest periods. In very hot and humid conditions, or when IPE is worn, reducing physical activity may be the only way to prevent dangerous increases in body temperature.

A9.3.6. Poor physical condition. Persons who are overweight or are poorly conditioned become fatigued more easily and do not adjust to working in the heat as quickly as those in good physical condition. Overweight and fatigue also impair the body's heat losing mechanisms; it takes work on the part of the body to lose heat, and an already tired body cannot perform this function well.

A9.3.7. Drugs which inhibit sweating, such as atropine, antihistamines, cold medicines, and some antidiarrheal medications can markedly impair heat loss.

A9.4. Prevention. Commanders must be prepared for decreased performance and heat stress casualties when acclimatization, water consumption and work/rest preventive measures are not applied. The keys to preventing heat illness and sustaining performance are knowledge of weather information for a unit's specific location and implementation of preventive measures accordingly. Heat illness prevention guidance is often tied to a parameter known as the Wet Bulb Globe Temperature (WBGT) index. The WBGT index is a combination of measurements which take into account dry air temperature, relative humidity, and radiant heating. The Bioenvironmental Engineer has the field apparatus necessary to determine the WBGT index. Heat illness preventive measures cannot be prescribed precisely because climates, working conditions and individual capabilities will vary widely. It is therefore important to understand the principles driving these guidelines.

A9.4.1. Acclimatization. All individuals who work for the first time under heat stress will develop signs of strain such as abnormally high body temperature, pounding heart, fatigue and other signs of heat intolerance. With planned, progressively more heat exposure and physical activity each day, physiological changes occur that will allow personnel to withstand the heat. On succeeding days of working in the heat, work can be done with less difficulty. This enhanced tolerance to heat is called heat acclimatization.

A9.4.1.1. A period of acclimatization is required for all personnel regardless of individual physical condition. Typically, the mid-way point toward full acclimatization can be reached by the end of the first week. In most cases, full acclimatization will be reached in up to two weeks. The time it takes to acclimatize will vary with each individual. Those in good physical condition will acclimatize most quickly.

A9.4.1.2. Resting for three or four days in the heat, with activity limited to that required for existence, results in only partial acclimatization. Although advantage should be taken of the cooler hours in accomplishing a portion of the work, the schedule should include gradually increasing exposure during the hotter parts of the day rather than complete exclusion of work at that time. Physical work in the heat must be accomplished for development of full acclimatization to that work level in a given hot environment.

A9.4.1.3. Work schedules should be adjusted to facilitate the acclimatization period. To start, the most strenuous tasks should be performed when it is cooler (in the early morning or evening), with lighter duty tasks performed during the remainder of the day. As the acclimatization proceeds, the ability to perform at the same level of heat stress improves, and more strenuous work can be added gradually. A day or two of intervening cool weather will not interfere significantly with acclimatization to a hot environment.

A9.4.1.4. Recreation and physical fitness training should be approached the same way. Start with less strenuous activities (e.g., softball) and gradually increase to the more strenuous (e.g., calisthenics, running).

A9.4.1.5. Personnel will retain their acclimatization for approximately one week after leaving the hot environment. If not exposed to work in high temperatures, the acclimatization will then decrease, the major portion being lost within one month. Therefore, the acclimatization process needs to be reinforced to varying degrees when ambient and workload conditions change. If there is a sudden heat spell or significant increase in humidity, increase in workload, or absence from the local area conditions for a week or more, individuals will need time to reacclimatize.

A9.4.2. Hydration. Water is critical for maintaining health and individual performance, since the human body is highly dependent on water to cool itself in a hot environment.

A9.4.2.1. All water and ice cubes consumed must be from a medically approved source to prevent waterborne illnesses. Individuals should carry as much water as possible when separated from medically approved water sources. Plain water is the beverage of choice, and personnel will be more likely to drink sufficient water if it is palatable. Whenever possible, provide cool (60-70 ^{o}F) water; if refrigeration is not feasible, water buffaloes or other distribution containers should be kept in the shade or insulated.

A9.4.2.2. Fruit flavored powdered drink mixes may be added to improve the taste of water; however, flavoring (or any drink other than potable, disinfected water) should not be added directly to

canteens or bulk water storage/central distribution containers (such as water buffaloes, tanks). Flavoring (and other beverages) should be added to the personal drinking cup (or larger containers for group access). There are two reasons for this. First, plain, disinfected water from a canteen may be needed in an emergency, such as for irrigating eyes or wounds. Second, flavorings (or remnants of other beverages remaining in the container after use) can interfere with disinfection of central distribution containers and the ability to measure the disinfectant residual, which is often done with a colorimetric test.

A9.4.2.3. In addition to plain water, some of the fluid intake requirement can be met by almost any type of beverage (e.g., juice/fruit drinks, coffee/tea (decaffeinated preferred), soft drinks, soup, milk). If an electrolyte "sports" beverage is consumed, it should be diluted with plain water in a 1:1, or more diluted ratio. Drinks with caffeine or alcohol do not have to be totally restricted from the diet, but consumption should be moderate since caffeine and alcohol tend to increase urination which could lead to dehydration.

A9.4.2.4. Increased sweating requires additional water consumption. Acclimatization does not reduce water consumption requirements and may actually increase the requirements because acclimatization increases sweating to enhance the evaporative cooling capacity of the body.

A9.4.2.5. Thirst alone is not a good indicator of adequate fluid intake. Personnel will always need to drink before they feel thirsty. The optimum amount of water needed to prevent dehydration for any individual can not be predicted exactly due to individual physiology, climate, and physical activity, but there are "rule of thumb" guidelines for planning daily water consumption and supply needs in hot environments.

A9.4.2.6. It is much better to drink small amounts of water frequently than to drink large amounts occasionally. Following a drinking schedule may seem tedious, but in the long run it helps personnel drink more. An example drinking schedule is to drink one quart (canteen) of water in the morning, one quart at each of three meals, and routinely drink small amounts such as two cups (half a canteen) periodically throughout the work period.

A9.4.2.7. Personnel working in warm weather will need at least four to six quarts of water per day and more as work becomes more strenuous; in hot environments, 10 to 12 quarts per day. Under extreme heat, especially in an environment in which IPE is worn, water requirements can exceed over 20 quarts per day. In such cases, the rate of sweat production actually exceeds the maximum rate of water absorption from the gut (approximately 1.5 quarts/hour). Whenever guidance advises drinking more than 1.5 quarts per hour, plan for an extended rest and rehydration period to make up the deficit.

A9.4.2.8. **Table A9.1.** Heat Illness Prevention Guidelines, provides general recommendations for water consumption. One of the simplest ways to ensure hydration is adequate is for individuals to monitor their urine color. An adequately hydrated person will produce pale yellow urine; a dehydrated person's urine will be dark yellow to brown. Reduction in urine volume and frequency of urination are other simple observations each person can use as indicators of hydration status. Personnel should be instructed to use these methods, and adjust water consumption accordingly.

A9.4.3. Salt Replenishment. The amount of salt lost in sweat varies depending on the degree of acclimatization. As the body acclimatizes to the heat, sweat contains less salt. To prevent heat illness resulting from excessive salt loss, there must be adequate salt in the diet. During the acclimatization period, personnel should salt their food lightly. Once acclimatized, personnel should season their food

to their normal taste. In most cases, this will be adequate because the typical American diet and military rations contain sufficient amounts of salt to replenish that lost in sweat. Avoid excessive salt; this will contribute to dehydration. If food intake is cut drastically (e.g., eating only one meal per day), active personnel should salt their food lightly. Supplementation with salt tablets is not appropriate unless medically indicated and supervised by medical personnel.

A9.4.4. Work/Rest Cycles and Reduction of Heat Exposure. Body temperatures can rise very rapidly due to the combination of excessive heat and sustained activity. To prevent a dangerous increase in body temperature, heat production must be minimized by reducing work pace and increasing rest periods. In very hot and humid conditions, reducing the duration of physical activity may be the only way to prevent dangerous increases in body temperature. Acclimatization does not eliminate the need to observe work-rest cycle guidelines.

A9.4.4.1. Work schedules must be tailored to fit the mission, climate, and physical condition of personnel. Work/Rest Cycle recommendations are provided in **Table A9.1.**, Heat Illness Prevention Guidelines. Close supervision by commanders and medical personnel is essential in achieving maximum work output with minimum hazard. The following should be considered:

A9.4.4.1.1. Personnel should be allowed to seek relief periodically from potentially dangerous heat stress situations by resting in shaded or air conditioned areas, and by removal of IPE and other heavy equipment.

A9.4.4.1.2. Work and rest/recreation in the direct sun should be avoided as much as possible on hot days. When feasible, provide temporary shielding from the sun by using tents or improvise with canvas, ponchos, or parachutes. Shielding should allow for free air circulation.

A9.4.4.1.3. Even moderate exertion in MOPP gear can cause heat illness at lower WBGT indices. When IPE is worn, add 10 ^{o}F to the measured WBGT index and allow for additional time for tasks to be accomplished.

A9.4.4.1.4. Wear hats and keep long sleeves and long pant legs rolled down when in the sun. Clothing fabric should be as lightweight as possible and fit loosely to let air move between the clothing and skin.

A9.4.4.1.5. When mission permits, non-essential heavy physical work should be curtailed or even suspended when indicated by an elevated WBGT index. Whenever possible, plan to perform heavy work and physical training in the early morning or evening. Avoid the heat of the afternoon.

A9.4.4.1.6. Avoid resting directly on hot ground. The ground heated by the sun can be 30-45 degrees hotter than the air.

A9.4.4.1.7. Avoid unnecessary standing at attention in the heat, which places an added burden on the body's circulatory system.

A9.4.4.1.8. Heat rash can be avoided by keeping skin clean and allowing it to dry between heat exposures.

Table A9.1. Heat Illness Prevention Guidelines1

WBGT Index	Water Intake	Work/Rest Cycles for Acclimatized	Activity Level For Unacclimatized Personnel
78 - 81.9	at least 1/2	continuous	continuous
82 - 84.9	at least 1/2 - 1	50/10	Use discretion in planning strenous activity
85 - 87.9	at least 1	45/15	When mission permits, limit strenous exertion; avoid activity in direct sun; observe personnel for water consumption and signs of heat illness.
88 89.9	at least 1 1/2	30/30	When mission permits, curtail non-essential strenuous tasks; avoid activity in direct sun; observe personnel for water sonsumption and signs of heat illness.
90 and up	at least 2	20/40	Highest risk of heat casualties; suspend all but essential strenuous tasks to meet operational requirements; avoid activity in direct sun; observe personnel for water consumption and signs of heat illness.

Notes: This table is based on Table 2-3, Headquarters, Department of the Army: Unit Field Sanitation Team. FM 21-10-1, 11 Oct 89.

1. How to interpret **Table A9.1.**:

- Work/rest cycle recommendations are based on personnel who are fully acclimatized, optimally conditioned, hydrated and rested.

- Individual requirements and capabilities may vary widely. It is more important to understand the trends and underlying principles of heat illness prevention than to follow the guidance exactly.

- IF IPE is worn, add 10× F to the WBGT Index. Judgment may be used to make other adjustments. For example, if cotton coveralls are worn over clothes, add 2× F to the index.

- Rest means minimal physical activity, and should be accomplished in the shade, if possible. Any activity requiring only minimal physical activity can be performed during “rest”. Examples are classroom type training, paperwork, minor maintenance on vehicles or weapons, and personal hygiene activities

- Water intake shown supports work/rest cycles. When work/rest cycles cannot be applied due to critical mission requirements, add 1/2 to 1 more quart per hour (based on work intensity) to value in table.

- A reasonable upper limit for total consumption of water for a 12 hour work day is 12-15 quarts. The maximum sweating rate (approx. 2 quarts/hour), is higher than the maximum rate of water absorption from the gut (approx. 1.5. quarts/hour. Whenever the table advises drinking more than 1.5 quarts per hour, plan for an extended rest and rehydration period to make up the deficit.

WBGT Index	Water Intake	Work/Rest Cycles for Acclimatized	Activity Level For Unacclimatized Personnel
- This guidance is not a substitute for common sense and experience; the appearance of heat casualties is a sure sign that the safe limit of work time has been exceeded and/or water consumption is inadequate. - The occurrence of a heat casulaty should be considered a warning that other individuals may be at immediate risk.			

Attachment 10

SELECTIVE UNMASKING

NOTE: Commanders may choose to use or not use selective unmasking as part of their verification that chemical-biological agents have dissipated or not been used. To eliminate the accidental discharge of firearms due to incapacitation, disarm personnel selected for unmasking.

A10.1. When chemical agent detectors ARE AVAILABLE, conduct tests using all available chemical agent detectors. Perform the following steps only if no agents are detected.

A10.1.1. At each location where selective unmasking is implemented, have one individual unmask for 5 minutes (use enough people to cover all areas of the base). Then have them properly don and check their protective mask and wait for 10 minutes, preferably in the shade.

A10.1.2. Observe the individuals for chemical agent symptoms as specified by local medical authorities.

A10.1.3. If no symptoms are observed, the commander should consider the area free of contamination.

A10.2. Unmasking procedures when chemical agent detectors ARE NOT AVAILABLE are:

A10.2.1. At each location where selective unmasking is implemented (use enough people to cover all areas of the base) have one individual hold their breath, keeping their eyes open, and break the seal of their masks for 15 seconds. Then have them properly don and check their protective mask and wait for 10 minutes, preferably in the shade.

A10.2.2. Observe the individuals for chemical agent symptoms as specified by local medical authorities.

A10.2.3. If they have no symptoms, have them again break the seal of their masks and take two or three breaths. Have them don and check their protective mask and wait for 10 minutes, preferably in the shade.

A10.2.4. Observe the individuals for chemical agent symptoms.

A10.2.5. If they have no symptoms, have the individuals unmask for 5 minutes. Then have them properly don their protective mask for 10 minutes, preferably in the shade.

A10.2.6. Check the individuals for chemical symptoms as specified by local medical authorities.

A10.2.7. If the individuals have no chemical symptoms, the commander should consider the area free of contamination.

Attachment 11

CONTAMINATION CONTROL MEASURES

A11.1. Contamination Control. This attachment identifies the components of contamination control i.e., avoiding, marking, and detecting contamination and by decontamination. Of these components, contamination avoidance before an attack is the most effective, cheapest, and easiest to perform.

A11.2. Pre-attack Measures. Units should:

A11.2.1. Protect critical resources by covering or placing inside a structure. Also, close aircraft canopies and doors, vehicle doors and windows, and building doors, windows, and openings; cover intakes; and shut down non chemical-biological filtered ventilation systems.

A11.2.2. Fill and seal water containers for later use.

A11.3. Trans-attack Measures. Take the best available cover in the immediate area and don all remaining required IPE. Seek protection from blast, projectiles, shrapnel, heat, and contamination, as directed by the threat.

A11.4. Post-attack Measures. Once contamination is present, units should consider implementing these measures to minimize the spread of contamination:

A11.4.1. Avoid obviously contaminated items and areas.

A11.4.2. Restrict movement to that needed for critical mission, damage assessment, and recovery tasks. Keep other non-essential personnel in their shelters.

A11.4.3. Employ contamination control measures outside each operational/occupied facility to reduce the accumulation of liquid chemical agent within the facility.

A11.4.3.1. Use the boot and glove bath or shuffle box at the entrance; and monitor for liquid contamination (M8 paper or M9 tape) at the entrance, either individually or using the buddy system or by assigned shelter team members. They should continue to do so until it has been determined there is no longer a contamination hazard.

A11.4.3.2. In shelters or work centers, units should, as a minimum, visually check for: unusual substances, dead animals, holes as opposed to UXO entry sites, night time black-out conditions, and visual warning flags as assigned.

A11.4.4. Mark contaminated items and areas using the NBC Marking Kit. Also, detector paper that has changed color should be left in place as an expedient contamination marker.

A11.4.4.1. Contaminated areas should always be marked unless the area is to be abandoned to the enemy. Contamination marking procedures should be designed for both the protection of personnel assigned to an area and for the prevention of casualties or unnecessary exposures among personnel of other commands or services.

A11.4.4.2. The type of contamination or danger in the area of concern is designated using colored warning signs (right-angled isosceles triangles). These signs may be made of wood, metal, plastic, or other adequate material available. See**Table A11.1.**Contamination Marking Signs.

Table A11.1. Contamination Marking Signs.

DANGER	PRIMARY COLOR	MARKINGS	INSCRIPTIONS
Radiological contamination	WHITE	NONE	BLACK “ATOM”
Biological contamination	BLUE	NONE	RED “BIO”
Chemical contamination	YELLOW	NONE	RED “GAS”
Chemical Minefields	RED	YELLOW STRIPE	YELLOW “GAS MINES”
Booby-trapped areas	RED	WHITE STRIP	NONE
Unexploded munitions	RED	WHITE BOMB	NONE

A11.4.4.3. Details of the contamination should be written on each sign, preferably on the front surface. For biological contamination and for persistent or moderately persistent chemical agents, the name of the agent used, when known, and the date and time of detection are required. For radiological contamination write the dose rate, date and time of reading, the date and time of detonation that produced the contamination, if known.

A11.4.4.4. Areas with more than one type of contamination will be marked with the relevant signs placed next to each other.

A11.4.4.5. Place the sign with longest edge up, with the front of sign facing away from the area being marked. Initially, signs may be placed on any suitable fence, tree, pole, etc.. For large or palletized equipment items, place a sign centrally on one side.

A11.4.5. Report contaminated areas to the SRC for plotting and assessment. Determine travel routes and contaminated areas and advise the base populace and command and control elements.

A11.4.6. Process personnel and material moving from a contaminated area to a TFA.

A11.4.7. Ensure personnel decontaminate themselves and their personal equipment as soon as practical after contamination occurs. They should also decontaminate items to reduce contact hazards or minimize contamination transfer.

A11.5. Decontamination. Decontamination efforts should be consistent with available resources and the contamination’s effect on critical mission operations. Limit decontamination operations to those necessary to minimize contact hazards and to limit spreading contamination to uncontaminated mission critical areas. The four types of decontamination operations are immediate, operational, thorough, and reconstitution. See **Attachment 1** for complete definition of immediate, operational, thorough, and reconstitution decontamination.

A11.5.1. Decontamination Equipment. Units should equip contamination control teams when needed:

A11.5.1.1. Responsible for chemical-biological warfare agent decontamination with the chemical defense groundcrew ensemble and wet weather clothing for splash protection.

A11.5.1.2. With brooms, mops, brushes, buckets, and soap. Units should also consider equipping these teams with the lightweight decontamination apparatus. T.O. 11C15-1-3, Chemical Warfare

Decontamination, Detection and Disposal of Decontaminating Agents, contains additional equipment requirements.

A11.5.1.3. With detection equipment to determine the effectiveness of their decontamination operations.

A11.5.1.4. With marking equipment to mark and identify contaminated areas resulting from decontamination operations.

A11.5.2. Primary Emphasis. Place primary emphasis on contamination avoidance, immediate decontamination, and operational decontamination.

Attachment 12

PRE-, TRANS-, AND POST-ATTACK ACTIONS

A12.1. This attachment identifies certain actions to take in a NBC environment. Use AFH 32-4014 Volume 4, *USAF Ability to Survive and Operate Procedures in a Nuclear, Biological, and Chemical (NBC) Environment* for key information, procedures, and actions needed to prepare for, survive, and restore mission capability after a NBC or conventional attack.

A12.2. Pre-attack.

A12.2.1. Units should plan to take these actions during the pre-attack phase.

A12.2.1.1. Disperse critical material. Place in protective shelters or provide other forms of protection against contamination, blast, and splinter.

A12.2.1.2. When an attack is probable, shelter personnel not performing mission essential tasks.

A12.2.1.3. When an attack is imminent, suspend all noncritical operations and put facilities, systems, and personnel in a full protective posture, to include sheltering personnel.

A12.2.2. Conventional Attack. Issue conventional IPE.

A12.2.2.1. Issuing and operationally checking individual and unit CB warfare defense material. Keep IPE available for immediate use.

A12.2.2.2. Beginning CB agent pretreatment. Seek advice from medical authorities.

A12.2.2.3. Recalling specialized teams to prepare CB defense material, facilities, and systems for operation. When ready, the teams may be released on standby.

A12.2.2.4. Upgrading collective protection system configuration from standby to ready. Finish stocking shelters with protective clothing, water, food, and supplies.

A12.2.2.5. Planning for open air CCAs, if applicable.

A12.2.2.6. Activating the NBC reporting system.

A12.2.2.7. Deploying CB detection, identification, warning systems, and CCTs, as required.

A12.2.2.8. Ensuring personnel use individual CB protective equipment (MOPPs 0-Alpha), according to this AFMAN.

A12.2.2.9. When an attack is probable, directing personnel not performing critical mission tasks to collective protection systems or available shelters.

A12.2.2.10. When an attack is imminent, activating CB detection, identification, and warning systems.

A12.2.3. Nuclear Attack. Obtain radiological defense materials from the CE readiness flight. Operationally check the RADIACs. Schedule training for the SMT.

A12.3. Trans-attack. When the attack warning signal is given or when under attack, take the best available cover in the immediate area and don all remaining required IPE. Seek protection from blast, projectiles, shrapnel, heat, and contamination, as dictated by the threat. Use conventional and CB IPE.

A12.4. Post-attack. Units should plan to take these actions during the post-attack phase.

A12.4.1. Continue to suspend noncritical mission activities until hazards are assessed. Restrict personnel not performing critical mission tasks to shelters. Personnel outside a shelter should use proper IPE. Stress contamination avoidance.

A12.4.2. Perform attack damage and hazard assessment. Survey the immediate area for casualties, unexploded ordnance, damage, indications of chemical agent use, or fallout. Report these findings and any observations on weapons systems, munitions, and tactics used in the attack to the survival recovery center (SRC), through respective unit control centers. Control centers may use AFVA 32-4022, *USAF Unexploded Ordnance (UXO)* for consolidated UXO recognition and reporting procedures.

A12.4.3. Begin recovery operations. Perform firefighting, rescue, casualty treatment, remains recovery and identification, explosive ordnance disposal, damage assessment, decontamination, and material and facility restoration, as required.

A12.4.4. Conventional Attack. If in a CB threat area and only a conventional protective posture was assumed, be alert for the possible use of CB agent.

A12.4.5. CB Attack: If in a CB threat area:

A12.4.5.1. Perform chemical agent monitoring to verify the presence or absence or presence and extent of chemical agents. Be alert for indications of biological agent use. If contamination is absent, direct a protective posture applicable to threat or further attack. If contamination is present:

A12.4.5.2. Conduct surveys to define and mark contaminated areas. Plot contaminated areas, advise the SRC on the agent persistency, and provide NBC reports and warnings.

A12.4.5.3. Implement contamination control measures to continue the mission and reduce the hazard. Inform personnel of the hazards and required protective actions.

A12.4.5.4. Implement the following contamination avoidance procedures:

A12.4.5.4.1. Keep everyone under cover, when possible.

A12.4.5.4.2. Keep vehicle windows rolled up and doors locked when unattended.

A12.4.5.4.3. Ensure facility heating, ventilation, and air conditioning systems are de-energized and windows are closed and cracks are taped.

A12.4.5.4.4. Ensure hatches on unsheltered aircraft are closed and sealed when possible.

A12.4.5.4.5. Place as much equipment as possible indoors or under cover. If the equipment cannot be placed under cover, wrap or cover it with plastic sheets, canvas, tarpaulins, etc. Coverings should be changed after an attack to prevent agent penetration.

A12.4.5.5. Change chemical-biological filters according to the exposure and replacement criteria in applicable technical orders.

A12.4.5.6. Biological warfare presents special problems due to the wide range of potential agents and methods of dissemination. Detection capability is limited to post-attack medical investigation and confirmation.

A12.4.5.6.1. Through all phases of operations, the medical intelligence officer evaluates the potential threat of biological warfare and epidemic diseases.

A12.4.5.6.2. Maintain good physical condition, obtain required immunizations, and good sanitation and hygiene measures.

A12.4.5.7. Individual protective equipment and decontamination procedures give a large degree of protection and minimize the spread of many agents.

A12.4.6. Nuclear Attack. If in a nuclear scenario:

A12.4.6.1. Monitor for the arrival of fallout.

A12.4.6.2. If fallout arrives at the installation:

A12.4.6.2.1. Continue shelter operations.

A12.4.6.2.2. Implement exposure control.

A12.4.6.2.3. Implement radiological contamination control.

A12.4.6.3. Plot nuclear detonations and fallout, predict radiation intensities, and submit required reports. If tasked as a North American Aerospace Defense Command (NORAD) reporting or collection center, follow the procedures in NORAD Instruction 10-22, *NBC Warning and Reporting System*.

Attachment 13

DEPLETED URANIUM SAFETY

A13.1. Depleted Uranium (DU) is an extremely dense metal used for protective shielding or in munitions to penetrate heavy armor. Exposure and incidents to DU may occur at anytime there is damage to a DU armor package or when an item (such as a vehicle) is hit with a DU munition. The Air Force primarily uses DU in aircraft counterbalances (C-5, C-141, etc.) and in 30 mm API (Armor Piercing/ Incendiary) GAU-8 munitions.

A13.1.1. DU can present a number of hazards depending on its physical form (solid versus particulate) and chemical form. These hazards can be grouped into three categories ; 1)radiological, 2) toxicological, and 3) pyrophoric.

A13.1.1.1. DU presents a radiological hazard from both an external and internal radiation dose standpoint. Externally, DU and its decay products emit beta and gamma /x-ray radiations which can serve as sources of external radiation for personnel. Contact gamma dose rates from bare DU can be on the order of 15 mrem/hr, while skin contact dose rate due to beta radiation from bare DU is approximately 238 mrem/hr.

Internally, insoluble DU oxide can be inhaled and deposited into the lungs where irradiation by alpha particles is the primary concern. In general, aircraft counterbalances and DU penetrators used in munitions are typically covered to prevent corrosion (oxidation). The primary group at risk for external exposure is munitions handlers and aircraft maintenance personnel. The primary groups at risk for internal exposure is personnel involved with DU contamination which can potentially become airborne and subsequently inhaled.

A13.1.1.2. Soluble forms of DU can present a significant toxicological hazard. Like any heavy metal, DU ingested/inhaled into the body, and subsequently entering the blood stream, may be toxic to the kidneys and other organs.

A13.1.1.3. The pyrophoric hazard presented by DU is normally associated with fine particulates of metallic DU generated during fabrication processes. Particulate oxides of DU are generated as a result of normal corrosive processes on exposed DU, fires, and penetrator impact with armor, but are not pyrophoric.

A13.2. Potentially Contaminated Media. Three areas that we may encounter are intact DU components, vehicle surfaces (inside/outside) and environmental media (soil, water, and air)

A13.2.1. The surface of DU comprising certain intact aircraft counterbalances and munition penetrators will corrode or oxidize if exposed to air. This surface oxidation can become a minor source of contamination of personnel, equipment, and vehicles and the local environment.

A13.2.2. Military and civilian vehicles may become contaminated with DU either as a result of direct penetrator strikes, traveling through a DU contaminated environment, or as a result of an accident/fire. Penetrators striking an armored target essentially burn their way through the armor. As a result, DU oxide particles are formed and can be deposited in or on the vehicle or short distances downwind (typically less than 100 yards). The metal surrounding the DU penetration hole is generally the area of highest contamination. The amount of DU contamination resulting from a crash of an aircraft having DU counterbalances is dependent on its physical integrity. The majority of aircraft accidents involving DU counterbalances, even those involving extensive fire, the counterbalances are normally intact and present only a minor source of contamination.

A13.2.3. Environmental media (and water) can be a receptor of contamination from other sources (i.e., weathering of intact DU components, DU released from penetrator strikes or fire, etc). The level of this contamination is minor in comparison to that encountered on vehicle surfaces, exposed counterbalance

surfaces, etc. The one exception is hard target range operations involving DU munitions which are left exposed to oxidize and further add to the soil contamination.

A13.3. Precautions. Ingestion/inhalation of DU from any form of contaminated media is the primary hazard of concern. Taking the necessary precautions to minimize these risk requires appropriate personnel protective equipment (i.e., clothing detection equipment, etc.) and procedures. Required procedures and equipment will vary depending on the type of work to be accomplished. Some common sense rules to apply when dealing with radioactive material are:

A13.3.1. In general, when radioactive contamination is present, the area should be evacuated or cordoned off and avoided. If it is necessary to work in a contaminated environment you must wear protective equipment. Also health monitoring or exposure control operations will be required.

A13.3.2. Ensure your protective equipment is operational and appropriate for the task to be accomplished

A13.3.3. Don’t eat, drink, or smoke in a potential contaminated area.

A13.3.4. Rolling down your sleeves and covering any exposed skin areas. This provides protection from alpha and beta radiation in the form of particles. You should pay particular attention to protecting open cuts or wounds. Cover your mouth with an uncontaminated cloth, surgical mask, or protective mask if available.

A13.3.5. Limit external hazards by wiping or washing exposed areas as soon as possible.

A13.3.6. Minimize time, maximize distance and maximize shielding in order to keep any doses received as low as possible.

Attachment 14

IC 2001-1 TO AFMAN 32-4005, PERSONNEL PROTECTION AND ATTACK ACTIONS

30 OCTOBER 2001

SUMMARY OF REVISIONS

This revision incorporates Interim Change IC 2001-1. This interim change provides guidance for the Air Force Contamination Control Area (CCA) processing for the Battle Dress Overgarment (BDO), Chemical Protective Overgarment (CPO), Joint Fire Fighter Integrated Response Ensemble (J-FIRE) and the Explosive Ordnance Disposal (EOD) Level A Suit. The Contaminant Air Processing System (CAPS) is the Air Force standardized CCA processing system and will be used to the maximum extent possible. However, not possessing the CAPS will not preclude implementing Air Force standardized processing procedures. It also includes mission critical equipment (MCE) refurbishment procedures. A "|" indicates revisions from the previous edition.

2.5. Site Components. Each CCA must have an entrance, Contact Hazard Area (CHA), Vapor Hazard Area (VHA), and an airlock/transition point between the VHA and Toxic Free Area (TFA). The CCA/TFA complex is composed of the following sub-elements, each connected in some way and can only be successfully accomplished through cohesive, integrated operations. See **Figure 2.3.** and **Figure 2.4.** for an example layout of the CCA site components.

Figure 2.3. Example of a Site Components Layout.

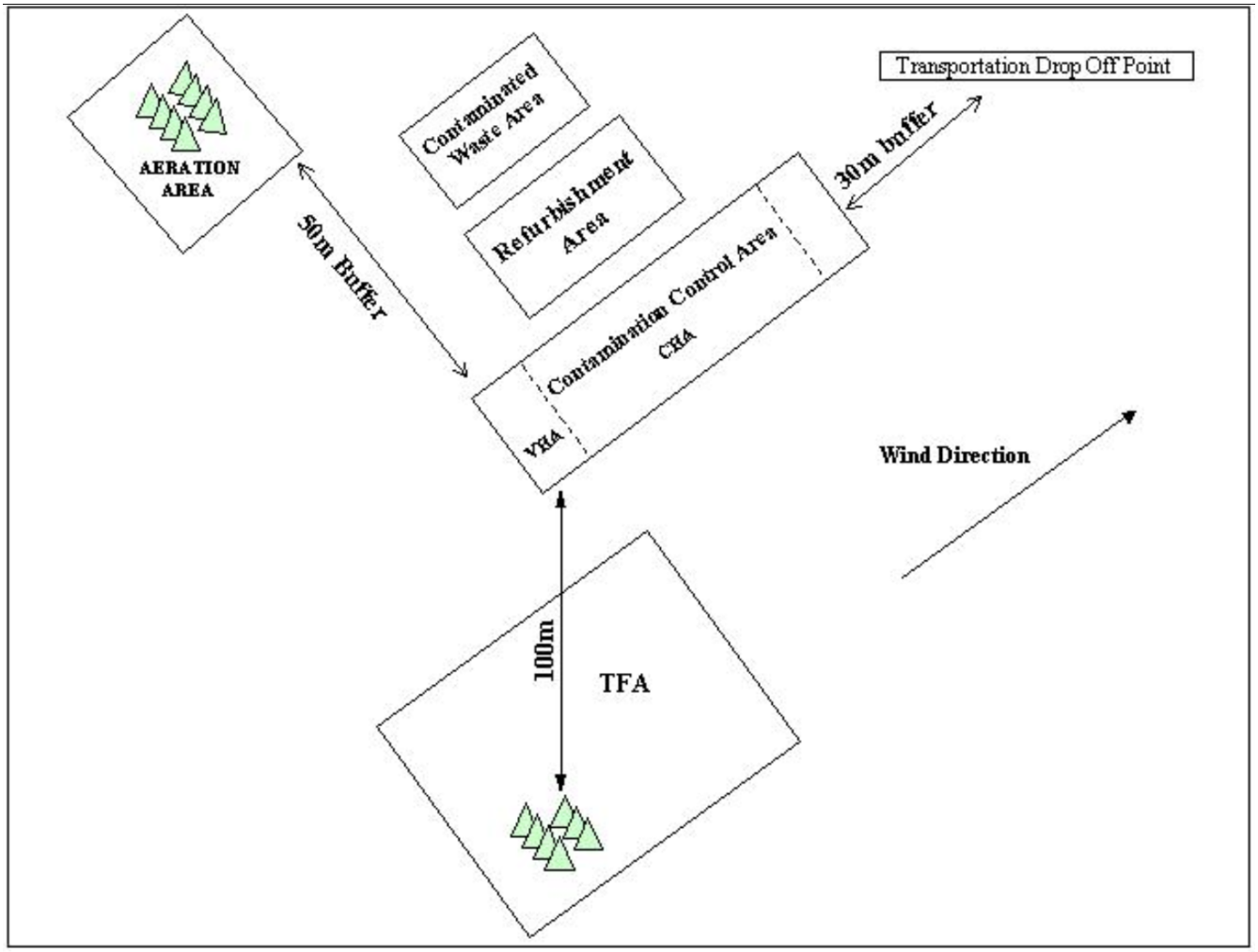
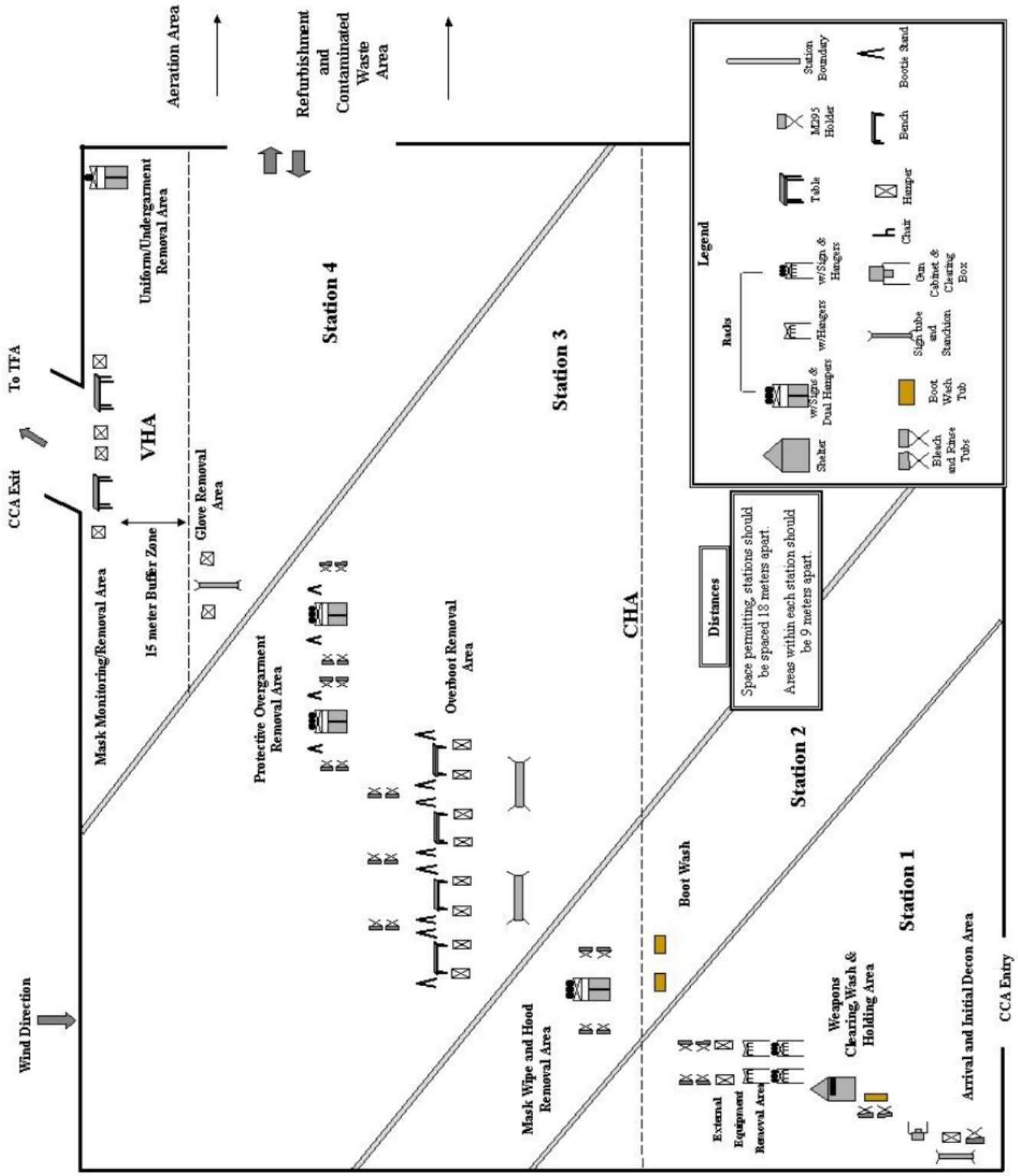


Figure 2.4. Example of a Contamination Control Area Layout.



2.5.2. CCA Entrance. The entrance to the CCA includes the following areas: Arrival and Initial Decontamination Area, Weapons Clearing, Wash & Holding Area, and the External Equipment Removal Area. Use this area to:

2.5.2.1. Perform initial decontamination of yourself and your buddy prior to entering the Contact Hazard Area. See **Table A2.9.** for CCA processing procedures.

2.5.2.2. Inform the processees of the sequence of events they will experience and any emergency response procedures.

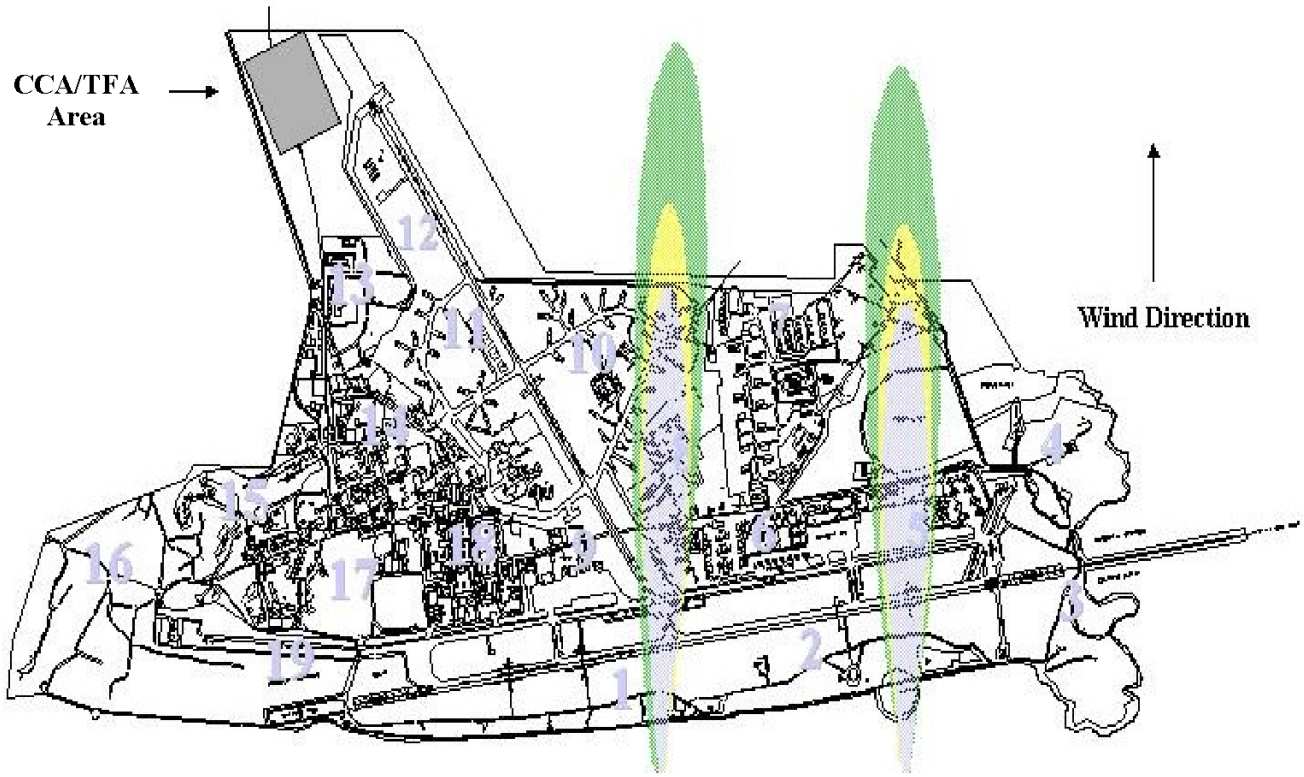
2.5.2.3. Provide a covered area for rest and shade while waiting to process.

2.5.2.4. Allow for turn in of weapons and the removal of external equipment worn other than the overgarment. i.e. Helmet, Vest (aircrew), Web Gear, Mask Carrier, Flak Vest, and Cold/Wet Weather Gear. Most of this equipment cannot be decontaminated to safe levels due to material composition. Equipment will be marked with individual's rank, name, and duty position for reissue to the same individual.

2.5.7. Mission Critical Equipment (MCE) Refurbishment Area. The purpose of the refurbishment area is to decontaminate MCE and return it to the warfighter as quickly as possible. This area includes refurbishment of groundcrew, firefighter and EOD equipment. Refer to **Table A2.13.** for MCE refurbishment procedures. To prevent bottlenecks during this process, this function should have dedicated personnel when the CCA is fully operational. Regardless of whether it is a single activity or several line-by-line activities, the people will require large supplies of plastic bags, M8 paper, M291/M295 decontamination kits, sponges and bleach. The refurbishment area should be located outside the CCA processing lines. See **Figure 2.3.** for an example of the Refurbishment Area location and **Figure A2.1.** for the Refurbishment Station layout. The refurbishment duties are split between the Contact Hazard Area and the Vapor Hazard Area. Ensure adequate space, dedicated personnel, and supplies are available for this tasking.

2.6. Site Selection. The most important step in selecting a suitable location for the installation CCA/TFA complex(s) sterns from a comprehensive vulnerability assessment. See **Figure 2.5.** for an example of where to establish the CCA in relation to the chemical deposition. The next consideration is knowing how large of an area will be needed. There are two main directions an installation may take.

Figure 2.5. CCA Site Selection



2.6.4.1. The first variable is the processing requirement. Once a processing line is established and people are moving through it (i.e., as one person leaves a station another person steps up), a relatively smooth flow will begin to take place.

2.6.4.2.2. The CCA processing lines will take a large amount of space in order to optimize processing and force protection ideals. Spread the lines out (distance between processing stations) as far as reasonably possible. If space permits stations should be spaced approximately 18 meters apart and areas within each station should be 9 meters apart.

Establish the lines in an angular and staggered fashion as opposed to a straight-line concept. The angle of the line should be a 20-degree angular configuration. Using this method, the concentration of ìtrailingî vapor hazards washing over people downwind of each processing station will be significantly reduced. See **Figure 2.4.** for the example of a CCA Layout.

2.6.4.2.5. Once monitored personnel remove their mask and proceed to the TFA. The further the better, but at least 25 meters is recommended from the end of the VHA to the TFA. See **Figure 2.4.**

2.7.1. Decontaminants. Liquid solution (5% chlorine solution) is preferred for most areas within the CCA. Normal household bleach is made at the 5% chlorine level. Do not use a 5% chlorine solution to decontaminate skin. Chlorine must be reduced to 0.5% for skin decontamination and must not be placed in open wounds. Standard decontamination kits (M291and M295) will also be used as appropriate for the task. The liquid chlorine mixture is placed in shuffle boxes for footwear decontamination and in troughs for glove decontamination steps. The amount needed for sustainment is based upon a number of variables,

such as the type of protective ensemble the individual is wearing, number of personnel processing and flowrate. The CCA attendants will ensure the shuffle boxes and hand troughs are initially filled and checked periodically for refilling as necessary. For planning purposes; the initial CCA start-up quantity using the groundcrew version CAPS is 73 gallons of bleach at 5% concentration and 46 gallons of water. See **Figure 2.4.** for CCA layout. The consumption rate to support 400 personnel is calculated at approximately 60 gallons of bleach (5% percent concentration) for BDO processing and 144 gallons for CPO processing; an average of 12 gallon of water was used for both processes. Consider contacting Civil Engineering Utilities personnel to create the 5% solutions required in order to reduce contract costs and airlift/storage requirements. Caution: shuffle pits become extremely slippery when filled with chlorine bleach. Look for solutions to the problem in advance such as laying terry cloth towels in the bottom of the pit to increase friction between overboots and the shuffle pit.

2.8.2. CCA Assistants. CCA assistants are shelterees selected to help operate the CCA as an additional duty when not performing mission essential duties. They perform assigned CCA support tasks for the CCA supervisor. At fixed sites locations the attendants can be identified through the installation READY program and deployed forces.

2.8.2.1. CCA Entrance. Provide an assistant in the holding area who can answer questions concerning the CCA/TFA, collect classified material and direct people to the appropriate processing line, thereby minimizing bottlenecks. Also provide an individual for weapons clearing/storage operations.

2.8.2.2. CHA Staffing. Minimum staffing, per shift, should be:
Note: The minimum staffing requirements listed below are based upon the complete setup of the CCA layout in **Figure 2.4.** Manning may fluctuate based upon the setup.

2.8.2.2.1. Four people to operate and handle suit transport to and from the aeration area.

2.8.2.2.2. One person to transport contaminated waste to the disposal area. (equipment operator preferably).

2.8.2.2.3. One person per processing line at the Mask Wipe and Hood Removal Area.

2.8.2.2.4. One person per two or three processing lines to assist personnel as necessary prior to their reaching the VHA.

2.8.2.3. VHA Staffing. Minimum staffing, per shift, should be:

2.8.2.3.1. Two to three personnel are necessary to monitor personnel at the BDU removal point for potential contamination. These personnel could also be utilized to monitor the air at the mask removal point.

2.8.2.3.2. Two people to operate and handle clothing transport to and from the aeration area.

2.8.2.3.3. Four personnel are necessary for mask refurbishment operations. See **A2.8.** for MCE refurbishment procedures.

Attachment 1, ***References***

ADD

Contamination Control Area Phase 2 - Sustainment Exercise Operational Support Study

Contamination Control Area Phase III Air Force Specialty- Specific Processing

Attachment 1, ***Acronyms and Abbreviations***

ADD

MCE – Mission Critical Equipment

A2.8. Individual Protective Equipment Disposition. Process equipment contaminated with vapor/liquid/solid chemical warfare agents as described below and using **Table A2.13.** for refurbishment of mission critical equipment. Coordinated base planning is necessary to identify decontamination facilities and contaminated waste disposal areas, and to develop operating procedures. Avoid extensive decontamination, because it is labor and resource intensive and not always effective.

A2.8.1. The overall decontamination method for the BDO is aeration. However, if the overgarment (BDO/CPO) is initially decontaminated soon after contamination fall (within 15 minutes) with the M291/M295 Decontamination Kit, the amount of chemical warfare agent absorbed by the OG could be greatly reduced. Furthermore, decontaminating with the M291/M295 will enhance the protection capability afforded by the OG. Although the BDOs may present a vapor hazard, they may have to be reused if OG stocks are depleted. Wearers of previously contaminated BDOs should be observed for any indication of chemical-biological agent exposure. At the present time CPOs cannot be reconstituted.

A2.8.2. Aerate BDOs outside the TFA and CCA boundaries. The area selected should provide protection from additional liquid contamination and a means of hanging the OG for aeration (racks are provided with the CAPS or the clothesline method is adequate). Special consideration is needed in open air CCAs to ensure that contaminated BDOs are aerated away from the TFA and mask removal point. Splinter protection is desirable. Aeration time depends on the temperature, amount and agent type, humidity, and airflow. To ensure aeration time is tracked, attach a tag, tape, etc to each BDO with the date and start time of aeration.

A2.8.2.1. Special consideration should be made to whether or not the BDOs were liquid/solid or vapor contaminated. Separate vapor from liquid contaminated suits and only reuse the liquid contaminated suits as a last resort.

A2.8.2.2. BDOs contaminated with VX may take weeks to decontaminate to acceptable levels, and is therefore aeration is not considered a viable option.

A2.8.2.3. Specific aeration times for all variables do not exist. For most agents, at least 72 hours at temperatures above 60 degrees should be sufficient to prevent a contact hazard. However, after one hour of

aeration, contamination levels are significantly reduced and may no longer present a transfer hazard. For monitoring purposes, wait 24 hours before initially monitoring aerated suits with the CAM.

A2.8.2.4. Even though the BDO has been aerated, its mission effectiveness may have been degraded by the previous chemical agent exposure.

A2.8.3. Ensure sufficient OG's are available at the CCA to support extended mission operations. Deplete new stocks before reusing previously contaminated BDOs.

A2.8.4. Monitor previously contaminated BDOs with the CAM before removing them from the aeration area. Example method: Place the suit into an enclosed container, i.e. plastic bag to concentrate the vapors and then perform CAM check. CAM must read 0 bars to reuse suits. Inform personnel being issued the previously contaminated suits that they were contaminated and that they should watch closely for any signs of CW agent exposure.

A2.8.5. Protective masks with liquid/solid contamination on the exterior surfaces, that are otherwise serviceable, will be serviced for reuse. Replace the hood, eyelens, outserts, and inlet valve caps (M17 series mask), when the mask is serviced. Change filter or canister elements according to technical order guidance. Discard masks with contamination on the interior surfaces.

A2.8.6. Groundcrew Protective gloves, cotton inserts, footwear covers, and hoods contaminated with liquid agents are discarded. Certain EOD and Fire equipment are refurbished for reuse. See **Table A2.13.** for MCE refurbishment procedures.

A2.8.7. Retain all other equipment, not addressed above for reuse, if it does not present a hazard. If decontamination is necessary, follow the procedures in T.O. 11C15-1-3.

A2.10. CCA Supervisor and Attendant Guidelines. The following information is provided to help the CCA supervisor and assistants perform their duties. They are especially important to the CCA assistants because they are not predesignated and trained. It may be necessary for one person to perform the tasks in more than one area and it may be possible to divide the tasks in a single area between several personnel. You may have to modify the information to add CCA-specific designs, equipment, supplies, and available manpower to fit your mission needs. If staffing allows, it's a good idea to have an assistant located in the holding area who can answer questions concerning the procedures and direct people to the appropriate processing line, thereby equalizing the flow of personnel and minimizing bottle necks.

A2.10.1. CCA Supervisor Actions. Use **Table A2.7.** for the CCA supervisor's actions.

Table A2.7. CCA Supervisor's Actions.

CCA SUPERVISOR'S ACTIONS
1. Coordinate with the shelter supervisor or NBC Control Center for required assistants. a. Brief assistants and provide them with checklists. b. Set work, rest, and replacement cycles for assistants c. Supervise assistants.
2. Set up the CCA and post instructions. a. As personnel leave the transportation point, they should be directed (either by signs or attendant) to the contamination control area. Monitor and prompt personnel processing to: - Follow all instructions carefully. - Touch only the outside of clothing. b. Ensure decontamination kits are placed throughout the line. Restock if necessary. One M295 per individual processing is the minimum required at the Arrival and Initial Decon Area. c. Ensure all footwear shuffle boxes are filled with a 5% chlorine solution. (Household bleach). Note: The boxes should be filled to the point that the solution covers the bottoms and sides of the overboots but not to the point that it rises well up into the OG pant leg area. Refill as necessary d. Ensure all glove wash troughs are filled with the 5% chlorine solution and the rinse troughs are filled with water. Refill as necessary. e. Ensure benches are available to facilitate footwear cover removal f. Ensure barrels/hampers and liners are at each station for discarded clothing and equipment. Empty with they become full. g. Determine the location of areas designated for contaminated waste and trash disposal, OG aeration, and other IPE decontamination. h. Ensure equipment and decontaminants are available to decontaminate the CCA.
3. Coordinate CCA restocking with the shelter supervisor.
4. Establish a clean egress route and post instructions.
5. Maintain a steady processing flow.
6. Clean and refurbish the lines regularly i.e., remove trash, empty OG hampers, refill chlorine.

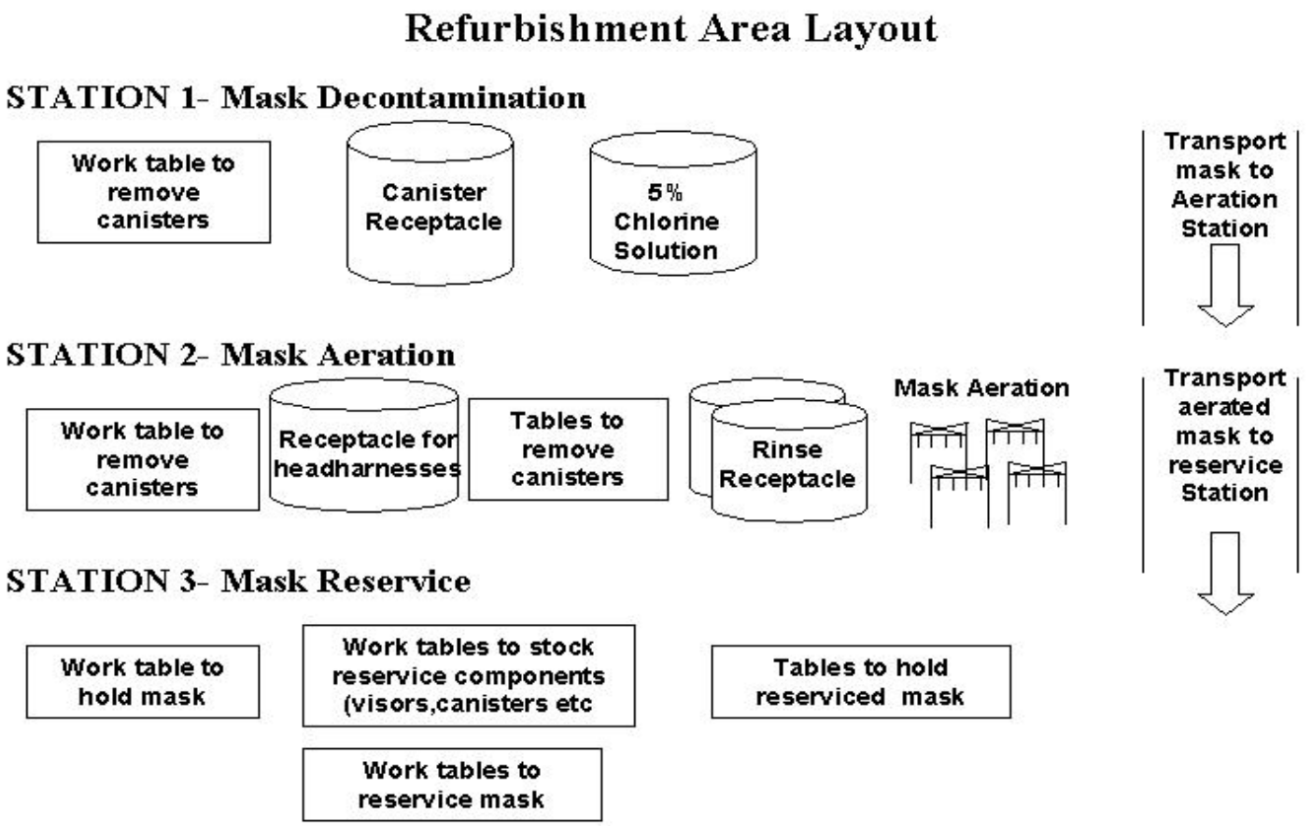
7. Decontaminate and refurbish the CCA items regularly.
8. **Refurbishment Area** - Ensure work space, spare mask parts, hoods, cloths, decontamination solutions, sponges, water, M291/M295 decontamination kits are available for cleaning and servicing masks. Restock supplies as necessary - Ensure containers and liners are available for removed items. - Ensure an overgarment and duty uniform aeration area is designated.
9. If there are instances where personnel must doff their underclothing, ensure the mask and clothing are removed from the hampers or airlock regularly.

Table A2.8. CCA Assistant's Actions.

CCA ATTENDANT'S ACTIONS
1. Keep decontaminant containers filled with 5% chlorine solution.
2. Collect, bag, and dispose of contaminated rubber IPE, as required.
3. Collect bag, and process classified material throughout the line, if required.
4. Collect and transport mission critical equipment to the Refurbishment Area.
5. Retrieve and store decontaminated IPE when needed.
6. Coordinate with the shelter supervisor to restock the CHA supplies.
7. Clean, monitor, and decontaminate the CHA; remove trash and contaminated items as necessary.
8. Pick up deposited masks from the Mask Monitoring/ Removal Area and transfer them to the Refurbishment Area. Once the mask are refurbished transport to the TFA.
9. Refurbish Mission Critical Equipment (MCE) See **Table A2.13.**
10. Transport aerated and refurbished MCE to the TFA.
11. Collect, separate, and stow duty uniforms.
12. Dispose of glove inserts and underwear.

ADD **Figure A2.1.** After **Table A2.8.**

Figure A2.1. Protective Mask Refurbishment Area Layout



A211. CCA Signs. The CCA processing signs may be downloaded from HQ AFCESA website at www.afcesa.af.mil. The signs are displayed throughout the CCA to guide personnel through the process of doffing and donning their IPE. The signs are based on the premise that individuals have been trained in CCA processing procedures in **Table A2.9.** Processing signs may be enhanced by including dual language, if required, and developing graphics and illustrations depicting processing procedures. Develop Weapons Clearing and Turn In signs according to AFI 31-207, *Arming and Use of Force*.

Table A2.9 CCA Processing Procedures

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
STATION 1					
Arrival and Initial Decontamination Area					
1. Split into two person "buddy" teams. **Note: Try to team with an individual wearing the same protective overgarment.**	*	*	*	*	
2. Disconnect Velcro for hose/canister and allow to hang freely.			*		
WARNING!! **Using two fingers apply pressure to the mask front voicemitter and to the beard of the JFIRE to hold the mask firmly in place and prevent loss of mask seal integrity.**					
3. Thoroughly decontaminate yourself and all exterior equipment, including your weapon, using the M295 decontamination kits provided. Buddies should assist each other in hard to reach areas. Special interest should be given to gloves, hood/mask, and filter canisters.	*	*	*		
4. Discard used M295 decon kits into the trash hamper.	*	*	*		
5. EOD buddy teams spray the 5% chlorine solution, using the multipurpose sprayer (pump pressurized) to all exposed areas of the Level A Suit.				*	
6. Proceed to the **Weapons Clearing, Wash and Holding Area.**	*	*	*	*	
Weapons Clearing, Wash and Holding Area					*
1. Complete Weapons Clearing/Turn In (If required) prior to decontaminating gloves and overboots.	*	*	*	*	
2. Step into Boot Wash Tray.	*	*	*	*	
3. Wash Gloves in Decon Tub.	*	*	*	*	
4. Rinse Gloves in Rinse Tub.	*	*	*	*	
5. If a holding area is not established, proceed directly to the **Equipment Removal Area.**	*	*	*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
Holding Area					
NOTE!! **EOD Personnel wearing Level A Suits will proceed directly to Station 3 - Overboot Removal Area. Decontaminate boots in foot trays provided along the way.** The Holding Area is designed to allow shade for personnel, turn in Classified material and ask any questions prior to processing. Informational signs may be developed for personnel to read while waiting.				*	
1. Attendant will obtain classified material. Place in an airtight bag and label it with the individuals Name, Rank, SSAN. The individual will receive the classified before the leaving the CCA to the TFA.					
The following information could be posted within this area.					
1. Carefully read the notices posted on the information boards prior to beginning your processing.					
2. Remove your individual protective equipment (IPE) in the order specified by the posted instructions.					
Important!! **Turn in all Classified Material. It will be returned to you before leaving the CCA.**					
External Equipment Removal Area					
WARNING!! **Take great care when doffing items. Do not remove mask or any chemical protective clothing. Contact hazard transfer to exposed skin and/or the respiratory tract can lead to sickness or death.**					
1. Undo the Velcro attachments on your hood underarm straps.	*				
2. Re-attach underarm straps over the shoulder.	*				
3. Remove all external items other than protective mask and overgarment and place on racks. These items include Helmet, Vest (aircrew), Web Gear, Mask Carrier, Flak Vest, Cold/Wet Weather Gear and other non-essential items. **IMPORTANT: Do not let previously deconned equipment touch the ground.**	*	*	*		
4. Empty all overgarment pockets and place items in hampers.	*	*	*		
5. Decontaminate and rinse gloves in tubs provided.	*	*	*		
6. Proceed to **Station 2 – Mask Wipe and Hood Removal Area.** Decontaminate boots in foot trays provided along the way.	*	*	*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
STATION 2					
Mask Wipe and Hood Removal Area					*
WARNING!! **Using two fingers apply pressure to the mask front voicemitter and to the beard of the JFIRE to hold the mask firmly in place and prevent loss of mask seal integrity.**					
1. Individual will:					
• Face the attendant and apply pressure to the front voicemitter.	*	*	*		
• Firefighters will hold mask in place with 2 fingers on the beard/breathing valve.			*		
2. Attendant will:					
• Loosen processee's hood drawstring.	*				
• Wipe down eyelens outserts and around the filter element using the 5% chlorine solution.	*	*			
• Wipe all exposed areas of the interspiro CW mask (lens and canister) with the 5% chlorine solution.			*		
• Repeat wipe down procedure with water.	*	*	*		
• Pull hood over processee's head and cut temple straps.	*				
• Pull the hood off the mask and drop it in the hamper.	*				
3. Attendant and individual will:					
• Decontaminate and rinse gloves in tubs provided.	*	*	*		
4. Individual will:					
• Proceed to **Station 3 – Overboot Removal Area.**	*	*	*		
IMPORTANT! **JFIRE personnel proceed directly to Station 3 - Protective Overgarment Removal Area.**			*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
STATION 3					
Overboot Removal Area					
IMPORTANT!! **While waiting in line, read all instructions for this station and watch the other processing teams in front of you.**					
1. Proceed to the first available bench as a buddy team, sit on opposite ends of the bench with boots resting on the "dirty" side of the bench.	*	*		*	
2. Undo both of your Velcro pant leg fasteners and unzip/untie leg fasteners completely.	*	*			
3. Undo all overboot fasteners.	*	*			
4. The outer pant leg of the Level-A suit is pulled up to fully expose the bunker boots.				*	
5. One individual will lift their leg closest to the center of the bench and rests it on the bench as your buddy removes the overboot/bunker boot and drops it into the hamper. Once the overboot/ bunker boot is removed place your foot on the clean side of the bench as you now straddle the bench.	*	*		*	
6. The other individual will complete the same procedures until both processees are straddling the bench.	*	*		*	
7. Utilizing the "Buddy" system the remaining boot is processed in the same manner.	*	*		*	
8. Wipe down bench with 5% chlorine solution.	*	*		*	
9. Decontaminate and rinse gloves in tubs provided and proceed to the **Protective Overgarment Removal Area.**	*	*		*	
Protective Overgarment Removal Area					
Important!! **Working as a buddy team, Do not sit, squat, kneel or touch the inside of the overgarment, bunker pants or Level A Suit as you remove them. One processee performs the procedure followed by his/her buddy.**					

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
Battle Dress Overgarment (BDO)					
BDO Trouser Removal					
1. Buddy will:					
• Unsnap rear snaps, untie waist cord, loosen side pull straps and unfasten front fly closure.	*				
2. Individual will:	*				
• Turn and face away from their buddy.	*				
3. Buddy will:					
• Lower the individual's pants to their knees. **Do not turn pants inside out as you remove them**	*				
4. Individual will:					
• Steady his/herself by holding on to the rack and extend their foot back one at a time.	*				
5. Buddy will:					
• Remove the individual's trousers and place them into the containment hamper.	*				
Important: Stand to the side of your buddy as you remove the pants. This prevents the pants rubbing against you.					
6. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.	*				
7. Repeat procedures for doffing buddy.	*				
BDO Jacket Removal					
1. Buddy will:					
• Loosen zippers, velcro fasteners, and untie the drawstring on the front of the jacket.	*				
• Undo Velcro attachment points on each sleeve cuff.	*				
2. Individual will:					
• Turn and face away from your buddy, straighten and hold fingers together in order to keep gloves on and hold arms behind you.	*				

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
3. Buddy will:					
• Pull the jacket down and away from the individual's shoulders helping them remove their arms from the sleeves one at a time.					
- Elastic sleeve cuffs – Jacket will come off inside out.					
- Velcro sleeves – Jacket will come off right-side out.					
• Place jacket in the containment hamper.	*				
4. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.					
5. Repeat the jacket removal steps for the doffing buddy and proceed to					
Joint Firefighter Integrated Response Ensemble (J-FIRE)					
Bunker pants and CPO trouser removal					
1. Individual will:					
• Push bunker pants down to the top of the bunker boots.			*		
• Reach through the CPO jacket and "pinch" hasp to release suspenders.			*		
2. Buddy will:					
• Unsnap and untie the waist elastic coat retention cord.			*		
• Unfasten the waistband hook and pile fastener tapes and front fly closures.			*		
3. Individual will:					
• Turn and face away from buddy.			*		
• Steady yourself by holding on to the rack. Extend your foot back one at a time.			*		
4. Buddy will:					
• Remove the bunker trouser, boot and CPO trouser at the same time and place them into the containment hamper.			*		
• Place an uncontaminated disposable plastic boot or sock on the foot before touching the ground.			*		
• Repeat the process for the other leg.			*		
5. Individual will:					
• Repeat this process for your buddy.			*		

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
6. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.			* *		
Firefighters will remove CPO Jacket according to the CPO removal procedures below.					
Chemical Protective Overgarment (CPO)					
CPO Trouser Removal					
1. Individual will:					
• Reach through your jacket and "pinch" hasp to release suspenders.		*			
2. Buddy will:					
• Unsnap and untie the waist elastic coat retention cord.		*			
• Unfasten the waistband hook and pile fastener tapes and front fly closures.		*			
3. Individual will:					
• Turn and face away from their buddy.		*			
4. Buddy will:					
• Lower the individual's pants to their knees.		*			
IMPORTANT!! **Do not turn pants inside out as you remove them**					
5. Individual will:					
• Steady themselves by holding on to the rack. Extend your foot back one at a time.		*			
6. Buddy will:					
• Remove the individual's trousers and place them into the containment hamper.		*			
7. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.		*			
8. Repeat procedures for doffing buddy.		*			

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
CPO Jacket Removal					
1. Buddy will disconnect the canister and hose assembly and secure it around breathing valve filter away from the CPO jacket.			*		
2. Your buddy will loosen zippers, and hook and pile tape on the front of the jacket, the jacket sleeves and the hood.		*	*		
3. Turn and face your buddy; Lean slightly forward with chin out and head up.		*	*		
4. Your buddy will stretch CPO hood out and pull back and roll back (inside out). away from your head.		*	*		
5. Turn and face away from your buddy, straighten and hold fingers together and hold arms behind you.		*	*		
6. Your buddy will pull the jacket down and away from your shoulders helping the processee remove their arms from the sleeves one at a time. **Note: Your arms should come out of the coat without turning the sleeves inside out.**		*	*		
7. Place jacket in the containment hamper.		*	*		
8. Individual and buddy will:					
• Decontaminate and rinse gloves in tubs provided.		*	*		
9. Repeat all above procedures for doffing buddy.		*	*		
10. Proceed to **Station 4 - Glove Removal Area.**		*	*		
EOD - HAZMAT Level A Suit					
Important: Each of the following steps requires the assistance of your buddy.					
1. Unfasten the belt inside your suit and don your chemical protective rubber gloves, which is also stored inside the suit.				*	
2. Open the velcro closure and zipper.				*	
3. Pull the suit down to knee level ensuring the outside of the suit does not contact the uniform or skin in the process.				*	
4. Remove the suit one leg at a time by lifting your leg backward and pulling it free from the leg and foot. Place a plastic sock or bootie on the exposed foot before it touches the ground.				*	
				*	

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
Note: Once the suit is unzipped, you may switch the CW interspiro mask from bottled air to ambient air.				*	
5. Place the suit in the hamper.				*	
6. Processee and buddy will decontaminate and rinse gloves in tubs provided and proceed to **Station 4 - Glove Removal Area.**				*	
STATION 4					
Glove Removal Area					
WARNING!! **Avoid contact with the outside of your rubber glove with your unprotected hands**					
1. Work both rubber gloves off at the same time and drop into hamper.	*	*		*	
2. Work the Fire/CW protective gloves at the same time until they are halfway off and drop into hamper.			*		
3. Proceed to the **Mask Monitoring/Removal Area.**	*	*	*	*	
Mask Monitoring Removal Area					
1. Individual will: • Face the attendant, spread legs apart and hold arms out to your side with your palms up.	*	*	*	*	**1 Per Monitoring Line**
2. Attendant Will: • Monitor individual using the CAM. (See procedures below)	*	*	*	*	
3. If cam bar readings are **less** than the CAM Monitoring Chart, the individual will remove their mask according to the Mask Removal procedures below.	*	*	*	*	
4. If cam bar readings are equal or greater to what is listed in the CAM Monitoring Chart, the individual will: - Don clean gloves and proceed to the **Uniform/Undergarment Removal Area.**	*	*	*	*	

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
CAM Monitoring Procedures					
1. Monitor the front and rear of the processee using an **X** pattern (if desired) and also monitor the outline of the body.	*	*	*	*	
2. Have the processee face away and extend their foot back one at a time and monitor the bottom of each foot.	*	*	*	*	
3. During monitoring pay special attention to the palms, wrists, ankles, neck, and bottom of feet.	*	*	*	*	
Mask Removal Procedures					
IMPORTANT!! **The attendant will document the individuals name and SSAN on a mask ID tag before the individual removes the mask**					
1. Attendant will: • Ask the individual their name and SSAN and write it on the mask tag.	*	*	*	*	
• Bring nomex hood forward so it rest over the mask.			*		
2. Individual will: • Using both hands, grasp lower headharness straps, take three deep breaths, holding the last one.	*	*	*	*	
3. Pull mask out and away from face, remove mask and the self contained breathing apparatus (if applicable) and place on table.	*	*	*	*	
4. Attendant will: • Attach the mask tag to the headharness buckle and place the mask in the container.					
5. Individual will: • Continue holding breath, obtain classified material (if applicable) and with eyes open **walk** to the Toxic Free Area.	*	*	*	*	
Uniform/Undergarment Removal Area					
Caution!! **Bending too far forward in the mask may cause the seal of the mask to leak on some individuals. Use the boot step (CAPS only) to elevate your foot when untying the combat bootlaces.**					

CCA Processing Steps	BDO	CPO	JFIRE	EOD Level A	Attendant
1. Place foot on boot step (CAPS only) and untie combat boots.	*	*	*	*	
2. Hold onto the rack for balance and remove combat boots, or disposable booties. You may use the boot remover (CAPS only) if you desire.	*	*	*	*	
3. Remove your BDU shirt and place it into the hamper.	*	*	*	*	
4. Remove your BDU pants and place it into the hamper.	*	*	*	*	
5. Return to the Mask Monitoring/Removal Area.	*	*	*	*	
EMERGENCY CCA PROCEDURES					
If cam bar readings are the same upon remonitoring, take the following emergency steps:					
1. Immediately stop CCA operations.					
2. Monitor surrounding area within the VHA to verify levels and look for any potential hot spots.					
3. If hot spots are found decontaminate by using decontamination kits, washing down area with 5% chlorine solution, sealing, removing, and covering.					
4. Once levels are below the ones listed in the CAM Monitoring Chart, continue CCA operations					
5. If levels have not changed - Check serviceability of CAMs. Replace as necessary and remonitor area. - Verify wind direction. Ensure you are still downwind or crosswind. If not, the CCA must be relocated to an upwind or crosswind location.					

Add **Table A2.11.** after **Table 2.10.**

Table A2.11. CAM Monitoring Risk Matrix Chart (CCA Line)

CAM SCALE	CAM BAR READING
H	3 or more bars Do Not Remove Protective Mask
G	1 or more bars Do Not Remove Protective Mask

Add **Table A2.12.** after **Table A2.11.**

Table A2.12. CAM Monitoring Risk Matrix Chart (Refurbishment and Aeration Area)

CAM SCALE	CAM BAR READING
H	1 or more bars Continue refurbishment or aeration until 0 bars
G	1 or more bars Continue refurbishment or aeration until 0 bars

Add **Table A2.13.** after **Table A2.12.**

Table A2.13. Mission Critical Equipment Refurbishment Procedures.

Refurbishment Procedures
BDO
Preparing the BDOs for aeration. 1. Inspect for serviceability. 2. Brush off excess decontaminant. 3. Check suits for signs of liquid contamination. 4. Separate vapor contaminated suits from liquid contaminated suits. 5. Remove M9 tape. 6. Sort the BDOs by size to ease future identification. 7. Tag each overgarment with the date and start time of aeration. 8. Hang BDOs for aeration. See **A2.8.2.** for additional guidance on overgarment aeration. 9. Monitor with a Chemical Agent Monitor (CAM) prior to removing them from aeration. See **Table A2.12.** for monitoring guidelines.
MCU-2A/P and M-45 Mask Refurbishment Procedures See **Figure A2.1.** for example of station layout.
Station 1 - Mask Decontamination – 1 Attendant
1. Remove and discard the filter canister. 2. Submerge the mask in a 5% chlorine solution for 30 seconds.
Station 2 – Mask Aeration –2 Attendants (Recommended)
Preparing Mask for Aeration 1. Remove the head-harness from the mask and submerge in water for approximately two minutes. **Note:** Remove the head-harnesses by cutting the straps immediately below the metal tab and discard the headharness. 2. After the two-minute rinse, remove the eyelens cover and wipe the cover with a dry towelette. 3. Hang mask for Aeration.
Station 3 – Mask Re-Service – 1 Attendant This Station attendant is responsible for removing the mask from aeration and preparing them for re-issue.
Prior to removing the mask from aeration the attendant will monitor the inside and outside of the mask with a Chemical Agent Monitor (CAM). See **Table A2.12.** for monitoring guidelines. **Preparing the mask for re-issue** 1. Refit the mask with an eye lens cover and place a new head-harness inside the mask. The processee is responsible for replacing the head-harness.

Refurbishment Procedures

2. Conduct a visual inspection and replace parts as needed.

3. Transfer refurbished mask to the Vapor Hazard Area.

Fire and EOD Specialized Equipment Refurbishment Procedures

Station 1 – Interspiro CW Mask Refurbishment

Note: Fire Department and EOD personnel will refurbishment the Interspiro CW Mask.

1. Disassemble the mask by removing the Nomex hood, C2 canister, hose cover, beard, voice cone and breathing valve assembly.

2. Seal the canister hose and discard the canister.

3. Hang up the Nomex hood, beard, and hose cover to aerate. Check with the CAM before reuse. See **Table A2.12.** for monitoring guidelines

4. Wipe the breathing valve assembly with 5% chlorine solution and rinse with water.

5. Submerge the disassembled mask in a 5% chlorine solution for 30 seconds and then rinse and agitate in a water solution for 30 seconds.

6. Hang the mask for aeration. See **Table A2.12.** for monitoring guidelines

7. Monitor the inside and outside of the mask with a Chemical Agent Monitor (CAM) prior to removing the mask from aeration. See **Table A2.12.** for monitoring guidelines.

8. Reassemble the mask and transfer to the Vapor Hazard Area.

Station 2 – Bunker Boots – 1 Attendant

1. Set boots into 4 inches of 5% chlorine solution for approximately 30 seconds. Scrub the bottom of the boots using a stiff brush. After wiping the sides of the boot with the chlorine solution, place the boot on the rinsing table. **Note:** Try and keep the inside of the boot as dry as possible.

2. Rinse the boots in the same manner as described in Step 1.

3. Hang boots upside down to aerate.

4. Monitor the boots with a Chemical Agent Monitor (CAM) prior to removing them from aeration. See **Table A2.12.** for monitoring guidelines.

5. Transport the boots to the VHA.

Station 3 - Firefighter Proximity Suit – 1 Attendant

1. Separate the exterior aluminized shell (silvers) from the interior bunker liners.

Refurbishment Procedures
2. Separate the bunker suspenders from the proximity trousers. 3. Hang the bunker liners and suspenders for aeration. 4. Submerge the bunker silvers in a 5% chlorine solution for 30 seconds.
5. Rinse by submerging them in a water solution for 30 seconds. 6. Hang the bunker silvers for aeration. 7. Monitor the bunker silvers with a chemical agent monitor prior to removing them from aeration. See **Table A2.12.** for monitoring guidelines. 8. Monitor the bunker liners and suspenders with a chemical agent monitor prior to removing them from the aeration rack. See **Table A2.12.** for monitoring guidelines. 9. Reassemble the bunker liners, silvers, and suspenders before transporting to the VHA.
Station 4 – Modified Structural ARFF Helmet – 1 Attendant
1. Submerge the ARFF helmet with aluminized dome cover and shroud (attachments) in the 5% chlorine solution for approximately 30 seconds. 2. Rinse the helmet and attachments with water in the same manner as step 1. 3. Place the helmet and attachments into aeration. 4. Monitor the helmet with attachments with a CAM prior to removing them from aeration before transporting to the VHA.
Station 5 – Fire Fighter/CW Protective Gloves – 1 Attendant
1. Submerge the gloves in the 5% chlorine solution for approximately 30 seconds. 2. Rinse the gloves by submerging and agitating in water for approximately 30 seconds. 3. Place the gloves into aeration. 4. Monitor the gloves with a CAM prior to removing them from aeration before transporting to the VHA. See **Table A2.12.** for monitoring guidelines

A2.12. Determining how many CCA's your base should setup:

A2.12.2.1.5. Based on a processing rate of 70 people per hour, your installation would have to establish 6 ground crew CCA's. See **A2.1.** for CCA layout.

A2.12.2.2.7. Based on a processing rate of 70 people per hour, your installation would have to establish 2 ground crew CCA's.