

APPENDIX I

GLOSSARY OF COMMON MILITARY TERMS

AIR DEFENSE—All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere or to nullify or reduce the effectiveness of such attack.

AREA OF OPERATIONS (AO)—That portion of an area of war necessary for military operations and for the administration of such operations.

AREA OF RESPONSIBILITY (AOR)—A defined area of land in which responsibility is specifically assigned to the commander of the area for the development and maintenance of installations, the control of movement, and the conduct of tactical operations involving troops under the commander's control, along with parallel authority to exercise these functions.

ARMORED PERSONNEL CARRIER (APC)—A lightly armored, highly mobile, full-tracked vehicle, amphibious and air-droppable, used primarily for transporting personnel and their individual equipment during tactical operations. Production modifications or application of special kits permit use as a mortar carrier, a command post, a flame thrower, an antiaircraft artillery chassis, or a limited recovery vehicle.

AVENUE OF APPROACH—An air or ground route of attacking forces of a given size leading to its objective or key terrain in its path.

AVIATION COMBAT ELEMENT (ACE)—One of the four elements of a Marine Air-Ground Task Force (MAGTF). The Aviation Combat Element (ACE) is task-oriented to provide all or a portion of the functions of Marine Corps aviation in varying degrees based on the tactical situation and the MAGTF mission and size. These functions are air reconnaissance, antiair warfare, assault support, offensive air support, electronic warfare, and control of aircraft and missiles. The ACE is organized around an aviation headquarters and varies in size from a composite aircraft squadron to one or more aircraft wing(s). It includes the aviation command (including air control agencies), combat, combat support, and combat service support units required by the situation. Normally, there is only one ACE in a MAGTF.

BARRIER—A coordinated series of obstacles designed or used to channel, direct, restrict, delay, or stop the movement of an opposing force and to impose additional losses in personnel, time, and equipment on the opposing force. Barriers can exist naturally, be man-made, or a combination of both.

BAS—Battalion aid station.

BASE—An area or locality containing installations that provide logistic or other support.

BRIGADE SERVICE SUPPORT GROUP (BSSG)—The BSSG is the task-organized combat service support element of the Marine amphibious brigade (MAB). Personnel and equipment are assigned to the BSSG from the permanent battalions of the force service support group. As required, it may be augmented by combat service support elements from the division or air wing.

CASUALTY STATUS—A term used to classify a casualty for reporting purposes. There are seven casualty statuses: (1) deceased, (2) duty status - whereabouts unknown, (3) missing, (4) very seriously ill or injured, (5) seriously ill or injured, (6) incapacitating illness or injury, and (7) not seriously injured.

COMBAT SERVICE SUPPORT DETACHMENT (CSSD)—A task organization from any combination of combat service support resources. It may or may not be part of a MAGTF, dependent upon the situation. For example, it could be formed to augment the organic capability of a reinforced infantry battalion conducting an independent operation or to support a squadron located at a remote airfield. The command and control element will normally be provided by the force service support group.

COMBAT SERVICE SUPPORT ELEMENT (CSSE)—One of the four elements of a Marine Air-Ground Task Force (MAGTF). It is task-organized to provide the full range of combat service support necessary to accomplish the MAGTF mission. The CSSE can provide supply,

maintenance, transportation, deliberate engineer, health, postal, disbursing, prisoner of war, automated information systems, and exchange. The CSSE varies in size from a MAU service support group (MSSG) to a force service support group (FSSG). Normally, there is only one Combat Service Support Element in a MAGTF.

COMBAT SERVICE SUPPORT OPERATION CENTER (CSSOC)—The agency that controls and coordinates the day-to-day operations of the combat support elements.

COMBAT SUPPORT ELEMENTS (CSE)—Those elements whose primary missions are to provide combat support to the combat forces and which are a part, or prepared to become a part, of a theater, command, or task force formed for combat operations.

COMMAND AND CONTROL—The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures used by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.

COMMAND ELEMENT (CSE)—One of the four elements of a Marine Air-Ground Task Force (MAGTF). It is the MAGTF headquarters. The Command Element is a permanent organization composed of the commander, the general or executive and special staff sections, the headquarters section, and requisite communications and service support facilities. The command element provides command, control, and coordination essential for effective planning and execution of operations by the Aviation Combat Element (ACE), the Ground Combat Element (GCE), and the Combat Service Support Element (CSSE). There is only one command element in a MAGTF.

CONTAMINATION—The deposit and/or absorption of radioactive material or biological or chemical agents on and by structures, areas, personnel, or objects.

CONVOY ESCORT—An escort to protect a convoy of vehicles from being scattered, destroyed, or captured.

DEAD SPACE—An area within the maximum range of a weapon, a radar, or an observer that cannot be covered by fire or observation from a particular position because of intervening obstacles, the nature of the ground, the characteristics of the trajectory, or the limitations of the pointing capabilities of the weapons.

DECONTAMINATION—The removal or neutralization of hazardous levels of chemical, biological or radiological contamination from personnel and material.

DEFENSE AREA—For any particular command, the area extending from the forward edge of the battle area to its rear boundary. It is here that the decisive defensive battle is fought.

DEFENSE IN DEPTH—The siting of mutually supporting defense positions designed to absorb and progressively weaken attack, to prevent initial observations of the whole position by the enemy, and to allow the commander to maneuver his reserve.

DETAILED EQUIPMENT DECON—Process of removing or neutralizing contamination on interior and exterior surfaces of unit equipment to negligible risk levels to allow MOPP level reduction for extended periods.

DETAILED TROOP DECON—Process of decontaminating individual fighting equipment to negligible risk levels; removing contaminated MOPP gear including protective masks; decontaminating protective masks; and monitoring personnel equipment for decon effectiveness. This is done to reduce MOPP levels for extended periods.

FINAL PROTECTIVE FIRE (FPF)—An immediately available prearranged barrier of fire designed to impede enemy movement across defensive lines or areas.

FIRE PLAN—A tactical plan for using the weapons of a unit or formation so that their fire will be coordinated.

FIREPOWER—The amount of fire which may be delivered by a position, a unit, or a weapon system.

FORCE SERVICE SUPPORT GROUP (FSSG)—The FSSG is a permanently structured organization whose mission is to provide CSS for the Marine amphibious force (MAF). It is designed to support one division and one air wing. If supporting a force of greater size, additional assets are necessary to augment its capabilities.

GROUND COMBAT ELEMENT (GCE)—One of the four elements of a Marine Air-Ground Task Force (MAGTF). It is task-organized to conduct ground operations. The GCE is constructed around an infantry unit and varies in size from a reinforced infantry battalion to one or more reinforced Marine division(s). The GCE also includes appropriate combat support and combat service support units. Normally, there is only one Ground Combat Element in a MAGTF. Although permanently structured with eight functional battalions, task organizations from those battalions would normally support MAF operations over a wide geographic area.

HASTY DECON OPERATION—A decon operation that consists of two techniques, the MOPP gear exchange and the vehicle wash down.

HELICOPTER LANDING SITE—A designated subdivision of a helicopter landing zone in which a single flight or wave of assault helicopters land to embark or disembark troops and/or cargo.

HELICOPTER LANDING ZONE (HLZ)—A specified ground area for landing assault helicopters to embark or disembark troops and/or cargo. A landing zone may contain one or more landing sites.

HOT LINE—A real or imaginary line that separates contaminated from uncontaminated areas.

INTELLIGENCE—(1) The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas and (2) the information and knowledge about an adversary obtained through observation, investigation, analysis, or understanding.

KEY TERRAIN—Any locality, or area the seizure or retention of which affords a marked advantage to either combatant.

KILLING ZONE—An area in which a commander plans to force the enemy to concentrate so as to destroy him with conventional weapons or the tactical employment of nuclear weapons.

LANDING ZONE (LZ)—Any specified zone used for the landing of aircraft.

MAIN BATTLE AREA—That portion of the battlefield in which the decisive battle is fought to defeat the enemy. For any particular command, the main battle area extends rearward from the forward edge of the battle area to the rear boundary of the command's subordinate units.

MARINE AIR-GROUND TASK FORCE (MAGTF)—A Marine Air-Ground Task Force is a task organization of Marine forces (division, aircraft wing, and service support groups) under a single command and structured to accomplish a specific mission. The Marine Air-Ground Task Force components will normally include command, ground combat, aviation combat, and combat service support elements (including Navy Support Elements).

MARINE AIRCRAFT GROUP (MAG)—The MAG is usually administratively and tactically structured by aircraft category as being either a helicopter group or a fixed-wing group. Composite MAGs may also be formed for specific missions or unique organizational/geographic considerations. Each MAG has a headquarters and maintenance squadron (H&MS). With a source of supply, the MAG is the smallest aviation unit capable of self-sustaining independent operations.

MARINE AIRCRAFT WING (MAW)—The MAW is the highest level aviation command in the Fleet Marine Force (FMF). Each wing is capable of supporting one Marine division. The MAW is task-organized to provide a flexible and balanced air combat organization capable of providing the full range of combat air operations in a variety of areas without the requirement of prepositioned support, control, and logistics facilities. Only the wing has the inherent capability of performing all six aviation functions.

MARINE EXPEDITIONARY BRIGADE (MEB)—A task organization which is normally built around a regimental landing team, a previsual Marine aircraft group, and a logistics support group. It is capable of conducting amphibious assault operations of a limited scope. During potential crisis situations, a Marine Expeditionary Brigade may be forward deployed afloat for an extended period in order to provide an immediate combat response.

MARINE EXPEDITIONARY FORCE (MEF)—

The Marine Expeditionary Force, the largest of the Marine air/ground task forces, is normally built around a division/wing team, but can include several divisions and aircraft wings, together with an appropriate combat service support organization. The Marine expeditionary force is capable of conducting a wide range of amphibious assault operations and sustained operations ashore. It can be tailored for a wide variety of combat missions in any geographic environment.

MARINE EXPEDITIONARY UNIT (MEU)—A

task organization which is normally built around a battalion landing team, reinforced helicopter squadron, and logistic support unit. It fulfills routine forward afloat deployment requirements, provides an immediate reaction capability for crisis situations, and is capable of relatively limited combat operations.

MARINE EXPEDITIONARY UNIT (SPECIAL OPERATIONS CAPABLE)—A

forward-deployed, embarked U.S. Marine Corps unit with enhanced capability to conduct special operations. The Marine expeditionary unit (special operations capable) is oriented toward amphibious raids, at night, under limited visibility, while employing emission control procedures. The Marine expeditionary unit (special operations capable) is not a Secretary of Defense-designated special operations force but, when directed by the National Command Authorities and/or the theater commander, may conduct hostage recovery or other special operations under extreme circumstances when designated special operations forces are not available. Also called MEU (SOC).

MARINE WING SUPPORT GROUP

(MWSG)—An administrative command that provides all essential aviation ground support (AGS) requirements for elements of the MAW. The MWSG is capable of supporting two fixed-wing and two rotary-wing airfields per MAW.

MAU SERVICE SUPPORT GROUP (MSSG)—A

task-organized combat service support element of the Marine amphibious unit (MAU). Like the BSSG, it draws personnel and equipment from the permanent battalions of the force service support group. As required, it may be augmented by combat service support elements from the division or aircraft wing.

MISSION ORIENTED PROTECTIVE

POSTURE—A flexible system for protection against NBC contamination. This posture requires personnel to wear only that protective clothing and equipment (MOPP gear) appropriate to the threat, work rate imposed by the mission, temperature, and humidity. There are five levels of MOPP (zero through 4). MOPP 4 offers the most protection but also degrades mission performance the most.

MOPP GEAR—Combat clothing and equipment

used to operate in an NBC environment.

MOPP GEAR EXCHANGE—Process of

decontaminating individual fighting equipment, including the protective mask and hood, removing the contaminated MOPP gear, and putting on new MOPP gear.

NEGLIGIBLE RISK LEVELS—Levels of

contamination that will cause mild incapacitation among no more than 5 percent (for chemical and biological contamination; 2.5 percent nuisance effect for radiological contamination) of the unprotected troops who operate for 12 continuous hours within 1 meter of a contaminated surface.

OPERATIONAL CONTROL (OPCON)—The

authority delegated to a commander to perform those functions of command over subordinate forces involving the composition of subordinate forces, the assignment of tasks, the designation of objectives, and the authoritative direction necessary to accomplish the mission. Operational control includes directive authority for joint training. Operational control should be exercised through the commanders of assigned normal organizational units or through the commanders of subordinate forces established by the commander exercising operational control. Operational control normally provides full authority to organize forces as the operational commander deems necessary to accomplish assigned missions and to retain or delegate operational control or tactical control as necessary. Operational control may be limited by function, time, or location. It does not, of itself, include such matters as administration, discipline, internal organization, and unit training.

OPERATOR'S SPRAY DOWN—Process of

applying decontaminant onto unit equipment control surfaces to stop contamination from soaking into surfaces.

- PARTIAL DECONTAMINATION**—The removal or neutralization of all visible or detectable contamination from individual clothing and equipment and from those surfaces of equipment that operators or crew members must contact to perform their mission-vehicle entry and exit routes.
- PASSIVE AIR DEFENSE**—All measures, other than active air defense, taken to minimize the effectiveness of hostile air action. These measures include deception, dispersion, and use of protective construction.
- PASSIVE DEFENSE**—Measures taken to reduce the probability of and to minimize the effects of damage caused by hostile action without the intention of taking the initiative.
- PERSONAL WIPE DOWN**—Process of removing or neutralizing contamination from the individual's equipment including the protective mask, hood, gloves, rifle, and helmet to stop contamination spread and to stop contamination from penetrating into equipment surfaces.
- PHYSICAL SECURITY**—That part of security concerned with physical measures designed to safeguard personnel; to prevent unauthorized access to equipment, installations, material, and documents; and to safeguard them against espionage, sabotage, damage, and theft.
- POWER-DRIVEN DECON EQUIPMENT**—Any of several different kinds of pump and heater units capable of spraying heated water or steam. Soap and decontaminants can also be mixed and sprayed through these units in most cases, such as the M12 power-driven decon apparatus and the XM17 SANATOR lightweight decon system.
- PROVISIONAL MOBILE SECURITY PLATOON (PMSP)**—Unit of the provisional security forces which provides the rear area security coordinator with a quick reaction capability in support of the RAS mission.
- PROVISIONAL SECURITY FORCES (PSF)**—Units available to the rear area security coordinator for supplementing local defense efforts and to give assistance to the military police in the performance of RAS missions.
- PYROTECHNIC**—A mixture of chemicals which when ignited is capable of reacting exothermically to produce light, heat, smoke, sound or gas, and may also be used to introduce a delay.
- REAR AREA OPERATIONS CENTER (RAOC)**—The agency responsible for planning, coordinating, directing, and monitoring rear area security.
- REAR AREA SECURITY (RAS)**—The measures taken before, during, and/or after an enemy airborne attack, sabotage action, infiltration, guerrilla action, and/or initiation of psychological or propaganda warfare to minimize the effects thereof.
- REAR AREA SECURITY COORDINATOR (RASC)**—That person responsible for planning, coordinating, and directing the RAS effort. The RASC is usually the CSSE commander but can be the ACE commander.
- RECONSTITUTION**—The rest, refitting, maintenance, and replacement necessary to restore a military unit to its full capability, often after it has been depleted by military operations.
- RATE OF FIRE**—The number of rounds fired per weapon per minute.
- RATE OF MARCH**—The average number of miles or kilometers to be travelled in a given period of time, including all ordered halts. It is expressed in miles or kilometers in the hour.
- SKIN DECON TECHNIQUE**—Process of removing or neutralizing contamination on the skin within 1 minute of contamination to prevent it from penetrating into skin.
- SITUATION MAP**—A map showing the tactical or the administrative situation at a particular time.
- SITUATION REPORT (SITREP)**—A report giving the situation in the area of a reporting unit or formation.
- SMALL ARMS**—Man portable, individual, and crew-served weapon systems used mainly against personnel and lightly armored or unarmored equipment.
- SPOT REPORT**—A concise narrative report of essential information covering events or conditions that may have an immediate and significant effect on current planning and operations that is afforded the most expeditious means of transmission consistent with requisite security.

STANDING OPERATING PROCEDURE (SOP)—A set of instructions covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness. The procedure is applicable unless ordered otherwise.

TABLE OF ALLOWANCE (TOA)—An equipment allowance document which prescribes basic allowances of organizational equipment and provides the control to develop, revise, or change equipment authorization inventory data.

TACTICS—(1) The employment of units in combat and (2) the ordered arrangement and maneuver of units in relation to each other and/or to the enemy in order to use their full potentialities.

TAP APRON—Toxicological agent protective apron.

TARGET OF OPPORTUNITY—A target visible to a surface of air sensor or observer which is within range of available weapons and against which fire has not been scheduled or requested.

TERRAIN ANALYSIS—The collection, analysis, evaluation, and interpretation of geographic information on the natural and man-made features of the terrain, combined with other relevant factors, to predict the effect of the terrain on military operations.

VEHICLE WASH DOWN—Process of flushing contamination off equipment surfaces to limit spread, reduce overall amounts of contamination, and speed weathering.

APPENDIX II

OVERLAY TECHNIQUES

1. GENERAL

Overlays provide a rapid and easily understood means by which the commander or his staff may express an operational plan, concept, or friendly or enemy situation. Standardization of technique is essential if tactical information is to be relayed without misunderstanding. Guidelines for the pictorial representation of tactical situations are established in this appendix.

2. MILITARY SYMBOLS

a. Colors.—Colors in conjunction with military symbols denote the following:

(1) Blue or Black.—Friendly units and activities.

(2) Red. —Enemy units and activities. If this color is not available, enemy symbols are outlined with double black lines.

(3) Yellow.—Friendly or enemy areas of chemical, biological, or radiological contamination.

(4) Green.—Man-made obstacles.

b. Units and Installations

(1) Geometric figures form the basic symbols to represent units and installations. Future or proposed locations of units or installations are shown by broken lines. Examples of the more common figures areas follows:

(a) A unit:



(b) A headquarters or command post:
(staff is always to the left.)



(c) An observation or security post:







(d) A single purpose, logistical installation:














60NP0089

(2) To show the size of a unit, the appropriate size indication is placed on top of the basic symbols as follows:


(a) Fire Team		(f) Battalion	
(b) Squad		(g) Regiment	
(c) Section		(h) Brigade	X
(d) Platoon		(i) Division	X X
(e) Company		(j) Corps	X X X 60NP0070

(3) To show the type unit being represented, a symbol is placed inside the basic figure as follows:

(a) Infantry		(g) Medical	
(b) Armor		(h) Motor Transport	
(c) Assault Amphibious Vehicle/Unit		(i) Shore Party	
(d) Artillery		(j) Amphibious	
(e) Engineer		(k) NMCB	
(f) Reconnaissance			

60NP0071

(4) To indicate a particular unit or installation, place the unit's own designation (in accordance with its size symbol) to the left of the symbol with higher echelons of command to the right of the symbol. Slashes separate command echelons. To avoid cluttering the symbol, known units in the chain of command may be omitted.


Example: 3d plat, Company "A", NMCB 40  60NP0072


c. Weapons


(1) Symbols are also used to indicate the type and location of a weapon or group of weapons. When a weapon symbol appears on a map or overlay, the base of the shaft indicates the location of the weapon.


(2) Most weapons are derived from the following basic symbols:




(a) If the weapon has a high trajectory, a  is placed at the base of the weapon.

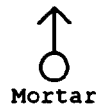
(b) A weapon which is a flat trajectory, antitank weapon has a  placed at the base of the shaft.

(c) If the weapon is primarily for air defense, a  is placed at the base of the shaft.

(d) A weapon which is a rocket projector or launcher has a  placed at the head of the shaft.

(e) If the weapon is also a tracked, self-propelled vehicle, a  is placed below the weapon symbol.

(3) Generally, the number and caliber of weapons are indicated by placing the number of weapons to the left of the symbol and the caliber to the right of the symbol.



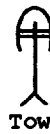
Mortar



Antitank rocket launcher



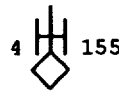
Dragon



Tow



Howitzer



A group of four tracked, self-propelled 155mm cannons

60NP0073

3. CONTROL MEASURES


a. Lines of control or coordination are drawn and labeled as shown below:


(1) Fire support coordination line **FSCL _____ FSCL**

(2) Restrictive fire line **RFL _____ RFL**

(3) Light line **LL _____ LL**

(4) Line of departure **LOD _____ LOD**

(5) Line of departure is present positions **LOD/PP  LOD/PP**

(6) Line of departure is forward friendly dispositions **LOD/FFD  LOD/FFD**

(7) Phase line with code name **PL _____ PL**
GREEN GREEN

- (8) Coordinated fire line CFL _____ CFL
- (9) Probable line of deployment PLD PLD
- (10) Final coordination line FINAL CL _____ FINAL CL

b. Control points are drawn on the selected terrain feature and identified as follows:

(1) A checkpoint consists of a circle enclosing a selected terrain feature with a number, letter, or code name placed inside the circle.



(2) A coordinating point is shown by drawing a circle on the selected terrain feature and placing an "X" in the center. Coordinating points are used in conjunction with boundaries to designate defensive areas.



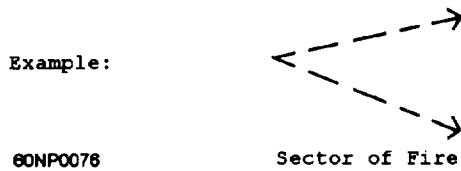
(3) A contact point is shown by drawing a square with a number placed inside.



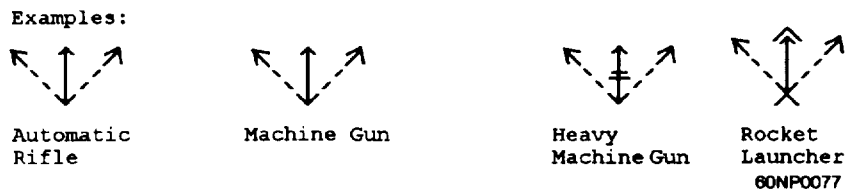
4. FIRE PLANS

a. Sector of Fire

(1) Representation of a sector of fire is shown by two arrows composed of broken lines:

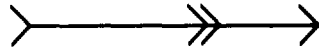


(2) A weapon symbol is normally used in conjunction with the symbol for a sector of fire. The base of the symbol indicates the weapon's position.



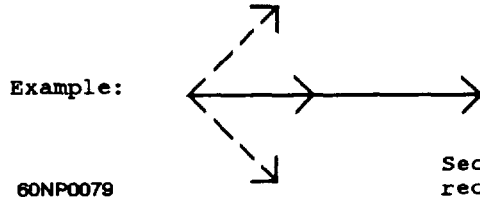
b. Direction of Fire

(1) A principal direction of fire is represented by a solid arrow. To prevent confusion with similar symbols, the symbol representing a principal direction of fire is always shown together with the appropriate weapon symbol.



Principal direction of fire for an antitank rocket launcher

(2) Symbols for sectors of fire and principal directions of fire are often combined.



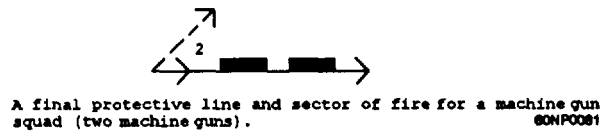
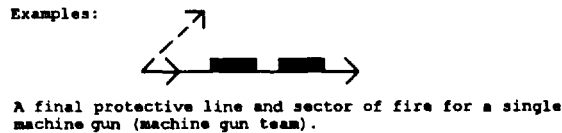
Sector of fire and principal direction of fire for a machine gun.

(3) A special principal direction of fire symbol is used to indicate final protective lines. Heavily shaded portions along the principal direction of fire symbol indicate areas of grazing fire.



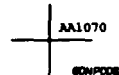
Final protective line for a single machine gun.

The final protective line symbol is usually combined with the sector of fire and weapon symbols.

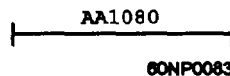


c. Targets

(1) Point targets of less than 100 yards



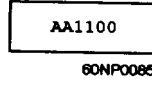
(2) Linear targets



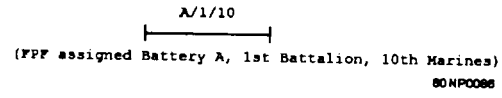
(3) Area targets



(4) Rectangular targets



d. Final Protective Fire



APPENDIX III

CHARACTERISTICS OF TOA WEAPONS FOR AN NMCB

WEAPON	AIR DET TOA	AIR ECH TOA	MAX EFFECTIVE RANGE/ METERS	RATE OF FIRE RDS PER MINUTE
Mortar 60MM M224	2	4	3,490	Sustained 15 Rapid 30
M16A2E3	76	574	800	Semi 45 Auto 90
Grenade Launcher M203	6	42	Area Target 350 Point Target 150	X
Pistol .45 Cal M1911A1	20	155	45	Sustained 10 Rapid 21-28
Shotgun M870	3	21	45	X
Machine Gun 50 Cal M2	2	4	1,830	Sustained 40 or less Rapid more than 40
Machine Gun 40MM MK19	2	4	1,500	Sustained 40 Rapid 60 or more
Machine Gun 7.62MM M60E3	4	12	Tripod 1,110 Bipod 750	Sustained 100 Rapid 200
Anti-Tank Weapon 84MM M136 HEAT	X	X	300	X

APPENDIX IV

DECONTAMINANTS

Decontaminants in this appendix are grouped in tables according to their classification of standard, nonstandard, and natural. See Tables A-1 through A-3. Each decontaminant is identified by name and NSN (where applicable). Some include pictures of the decontaminant or its container. The use of each decontaminant is listed as nuclear, biological, and/or

chemical, and brief directions are given on how to prepare each decontaminant. The tables also list any appropriate cautions for each decontaminant. A remarks column gives information on application, coverage, substitute solutions, and the related effectiveness of the decontaminants.

**Table A-1.—Standard decontaminants
(Decontaminants most often used and available in supply system)**


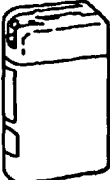

Decontaminant	Use	Remarks	Cautions	Preparation
<p>Decontaminating Solution No. 2 (DS2)</p>  <p style="text-align: center;">60NP0047</p> <p>DS2 in a 1-1/3 quart can NSN 6850-00-753-4827</p>  <p style="text-align: center;">60NP0048</p> <p>DS2 in 14-liter container for M13 DAP NSN 4230-01-136-8888</p>  <p style="text-align: center;">60NP0049</p> <p>DS2 in a 5 gallon pail NSN 6850-00-753-4870</p>	<p>Bio Cml</p>	<p>Effective against all known toxic chemical agents and biological materials (except bacterial spores) if sufficient contact time is allowed.</p> <p>Allow to remain in contact with contaminated surface for approximately 30 minutes. Rinse off with water. Recheck for contamination.</p> <p>Can be used at temperatures from - 15°F</p> <p>Used with the ABC-M11 1-1/2 quart portable decon apparatus, M13 DAP, or can be applied with brooms and swabs.</p> <p>Most effective when application is accompanied by scrubbing action.</p>	<p>Extremely irritating to the eyes and skin. Protective mask and rubber gloves must be worn. If DS2 contacts skin, wash the area with water. Do not inhale vapors. Will cause a green to black color change upon contact with ABC-M8 detector paper and cause a false/positive with M9 paper.</p> <p>Ignites spontaneously on contact with STB and HTH.</p> <p>Avoid spilling DS2 on chemical protective overgarment.</p> <p>Combustible. Do not confuse with fire extinguisher. DS2 is a combustible liquid with a flash point of 160°F. Spraying DS2 onto heated surfaces above 168°F will ignite the DS2.</p> <p>Do not use on M17-series mask (damages mylar diaphragm in voicemitter assembly).</p> <p>Corrodes aluminum, cadmium, tin, and zinc; softens leather. May soften, remove, or discolor paint. Rinse well after use and oil metal surfaces</p> <p>Ineffective against bacterial spores.</p>	<p>No mixing is required. Issued in ready-to-use solutions.</p>

Table A-1.—Standard decontaminants—Continued
(Decontaminants most often used are available in supply system)

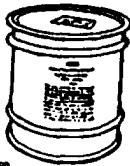
Decontaminant	Use	Remarks	Cautions	Preparation
<p>Supertropical Bleach (STB)</p>  <p>NSN 6850-00-297-6653</p>	Bio Cml	<p>Effective against Lewisite, V and G agents, and biological agents.</p> <p>Allow to remain in contact with contaminated surface for at least 30 minutes, then wash off with clear water.</p>	<p>Ignites spontaneously on contact with liquid blister agent or DS2.</p> <p>Gives off toxic vapors on contact with G agent.</p> <p>Not recommended for ship use. Top deck storage only.</p> <p>Corrosive to most metals and injurious to most fabrics (rinse thoroughly and oil metal surfaces).</p> <p>STB mixtures (dry and slurry) do not effectively decon mustard if it has solidified at low temperatures.</p> <p>Porous surfaces may require several applications.</p> <p>Should not be inhaled or come in contact with the skin.</p> <p>Protective mask or other respiratory protection device should be worn when preparing slurry.</p> <p>Store in unheated warehouse isolated from combustibles and metals subject to corrosion.</p>	<p>Slurry Paste—Mix one 50-lb drum of STB with 6 gal of water. Slurry paste consists of approximately equal parts (by weight) of STB and water.</p> <p>Dry Mix—2 shovels STB to 3 shovels earth or inert material (such as ashes).</p> <p>Slurry Mix—Chemical-Slurry mix will consists of 40 parts STB to 60 parts water (by weight). To mix in M12A1 use 1,300 lb. STB, 225 gal water, 12-1/2 lb antiset, 24 oz antifoam.</p> <p>Biological—Slurry mix will consist of 7 parts STB to 93 parts water (by weight). To mix in M12A1 use 150 lb STB, 225 gal water, 1-1/2 lb antiset, 24 oz antifoam.</p> <p>Camouflage—Lampblack or dye mixes maybe added for camouflage.</p> <p>No mixing.</p>
Mask Sanitizing Solution	Bio Cml	<p>Used on previously cleaned masks with filter elements removed.</p> <p>Place mask face up. Attach canteen to mask at the drinking tube. Drain one canteen full of sanitizing solution through the mask. Follow with two canteens of clean water as a rinse.</p> <p>Immerse mask and outserts in sanitizing solution. Agitate for 5 minutes. Rinse twice in clear water, agitating 2 or 3 minutes each time.</p> <p>Dry all parts and reassemble mask.</p>	1 gallon of solution needed for every ten masks.	<p>Fill standard plastic canteen to shoulder with water. Add one 0.5 gram tube calcium hypochlorite from water purification kit (NSN 6810-00-266-6979). Cover canteen and shake vigorously for 30 seconds.</p> <p>Mix bulk quantities as follows. Add 2.0 grams (.08 oz) of calcium hypochlorite from 6-oz jar (NSN 6810-00-255-0471) to 1 gallon of water.</p>
Soap and Detergents Detergent, general purpose, liquid (NSN 7930-00-282-9699)	Nuc Bio Cml	Scrub or wipe contaminated surfaces with hot, soapy water solution or immerse item in the solution.	Soaps and detergents are effective in physically removing contamination. However, casualty-producing levels of contamination may remain in the runoff water which must be considered contaminated.	<p>Mix 75 lb of powdered soap in 350 gal of water. If powdered soap is not available, bar laundry soap may be used (75 lb of soap, cut into 1-inch pieces and dissolved in 350 gal hot water).</p> <p>For smaller amounts of soap solution, use a ratio of approximately 1 lb soap per gal of water. Mix 2-pints detergent to 450 gallons water in M12A1 PDDE.</p>

Table A-2.—NonStandard Decontaminants
(Decontaminants not frequently used)

Decontaminant	Use	Remarks	Cautions	Preparation
Oxidizing Agents (potassium permanganate, potassium or sodium dichromate, nitric acid, or aqua regia)	Nuc	Effective in dissolving surfaces containing adsorbed or absorbed radioactive contamination. Dip into or coat surface with oxidizing agent. Exposure must be limited due to corrosive nature of solution. Rinse thoroughly with water and detergent and then with clear water.	Extremely corrosive. Use only under the supervision of an individual trained in their use. Neoprene or rubber protective apron, gloves, boots, and safety glasses must be worn. (Rubber offers only limited protection.)	Aqua regia is prepared by mixing 3 parts of concentrated hydrochloric acid and 1 part concentrated nitric acid. Other oxidizing agents do not require mixing.
Complexing (Chelating) Agents (versene, sequesterene, citric acid, sodium citrate, tartaric acid, sodium tartrate, oxalic acid, sodium oxalate, orthophosphoric acid, and similar agents)	Nuc	Aids in removal of contamination that is absorbed on surfaces. Apply as a film over contaminated surface using PDDA, fire fighting apparatus, or tree or garden sprayer. Allow 30 minutes contact time and flush with water.	Aids in physical removal of contamination but does not neutralize contamination. Runoff residue will be contaminated.	Mix 3 to 5 percent of agent (by weight) in water.
Iodine Water Purification Tablets	Bio	Where boiling of drinking water is impractical, two iodine tablets per canteen of water (proper instructions on container) are effective against most biological agents.	None	None
Disinfectant, Chlorine, Food Serve (NSN 6840-00-270-8172)	Bio	Effective for decon of utensils, mess gear, the exteriors of sealed containers, and food products that can withstand soaking. Dispose of any food or vegetable that is damaged and any outer leaves that are bruised or torn. Do not cut or peel fruits and vegetable before disinfecting them. Leave items in solution for 30 minutes and stir occasionally to insure that surfaces are kept thoroughly wet. Utensils may be disinfected by immersing in solution for 30 seconds. Rinse thoroughly in potable water. Do not use solutions more than once. If this disinfectant is not available, an emergency solution prepared by mixing at least one level mess kit spoonful of calcium hypochlorite (water disinfecting powder) to each 10 gal of water. If liquid chlorine bleach is available, it may be used. About one-third canteen cup of 5 percent chlorine bleach to each 10 gal of water will produce the same disinfecting strength. Fresh solutions must be made for rinsing and disinfecting utensils for each 100 persons.	None	Dissolve one package of disinfectant in 20 gal of warm potable water (100°F)

Table A-2.—NonStandard Decontaminants—Continued

Decontaminant	Use	Remarks	Cautions	Preparation
Formalin (formaldehyde)	Bio	<p>Effective against all microorganisms, to include bacterial spores.</p> <p>Recommended as interior decontaminant for relatively closed areas.</p> <p>Allow vapors to remain 16 hours in a closed structure, then aerate until odor is no longer objectionable.</p> <p>Optimum conditions for spraying are 70° to 80°F. 85 percent relative humidity. The minimum effective relative humidity is 70 percent. The minimum effective temperature is 60°F. at which the exposure time should be increased to 24 hours.</p> <p>Apply as vapor from standard insecticide sprayers or vaporize by heat or bubbling steam through pan of decontaminant.</p>	<p>Formalin vapors are very toxic. Will curl and discolor paper. Will leave white residue. Up to 72 hours aeration may be required.</p> <p>A self-contained breathing apparatus should be worn when remaining for more than a few minutes in a building containing formalin vapors.</p> <p>Personnel handling or spraying formalin should wear impermeable protective clothing.</p> <p>Personnel entering an area containing formalin vapor for only a few minutes should—</p> <ul style="list-style-type: none"> • Wear protective mask. • Wear washable outer clothing, fastened to prevent vapor from entering at wrist, ankles, or neck. • Remove outer clothing after emerging from vapor. • Shower and put on clean clothing as soon as possible. <p>Vapors of formalin are not flammable; open flame should not be used for vaporizing when methanol has been added to formalin. When steam is used, source of steam should be outside area being decontaminated.</p>	<p>No mixing required. However, less residue remains and less aeration is required if mixture of 5 parts formalin and 3 parts methanol are used. (Use this mixture at rate of 4/5 qt per 1,000 cu ft of space.)</p>
Detrochlorite	Bio	<p>A thickened bleach useful on vertical surfaces.</p> <p>Apply by means of a PDDA. Allow 30 minutes contact time, then rinse with water.</p> <p>Coverage is 1 gal per 8 sq yd.</p>	<p>Very corrosive.</p> <p>See "Preparation" column.</p>	<p>Mix by weight 19.3 percent diatomaceous earth, 0.5 percent anionic wetting agent, 2.9 percent calcium hypochlorite (70 percent available chlorine), 77.3 percent water.</p> <p>Mix wetting agent and diatomaceous earth with water before adding the calcium hypochlorite. Mixing the wetting agent and calcium hypochlorite in a dry undiluted state may cause an explosion.</p>
Paracetic Acid (PAA)	Bio	<p>Effective against all microorganisms to include bacterial spores.</p> <p>Allow 10 minutes contact time.</p> <p>Wipe item with rag or swab, remove excess acid, and aerate 10 to 15 minutes, or until no objectionable odor remains.</p> <p>Immerse small items for 10 minutes, remove excess acid, and aerate until no objectionable odor remains.</p>	<p>Fumes highly irritating. Prolonged exposure will damage most materials.</p> <p>40 percent solution has low flash point (105°F); 3 percent solution is nonflammable.</p> <p>Will cause burns and blister skin.</p> <p>Must be stored in original containers under refrigeration to prevent decomposition.</p> <p>Protective clothing and mask are required.</p>	<p>Available as 40 percent solution. Mix 1 qt to 3-1/2 gal of water (add paracetic acid to water.)</p>

Table A-2.—NonStandard Decontaminants—Continued

Decontaminant	Use	Remarks	Cautions	Preparation
Peracetic Acid (PAA)—Continued	Bio	SAME	A violent explosion may result if heavy metal ions come in contact with peracetic acid. Prolonged exposure will corrode iron and deteriorate rubber, Plastics, and leather.	SAME
Ethylene Oxide (ETO)	Bio	Effective against all microorganisms to include spores. Apply 30 lb for every 1,000 cu ft. Allow 6 hr contact time (contact time must be doubled for each 20°F drop in temperature below 75°F). Airtight enclosure required.	ETO is flammable. Not recommended for interior use (see carboxide below).	None
Carboxide	Bio	Carboxide is a mixture of ethylene oxide and carbon dioxide that is effective against all microorganisms to include spores. Apply 30 lb for every 1,000 cu ft. Allow 12 hr contact time (contact time must be doubled for each 20°F drop in temperature below 75°F). Carboxide is nonflammable and is recommended for interior use. Airtight enclosure required.	Will blister skin. Items worn next to skin must be aerated 18 to 24 hr.	None
Hyamine (Benzethonium chloride)	Bio	Effective against all bacteria. Allow 5 to 30 minutes contact time.	Very toxic. Estimated fatal dose to man 1 to 3 grams. Care should be taken when mixing to avoid inhalation of powder. Not to be used on ships.	Use a 0.1 to 1 percent solution (1 lb hyamine for every 12 gal of water yields 1 percent solution).
Sodium Hypochlorite Solution (household bleach)	Bio Cml	Effective against blister and V agents and all biological materials. Reacts rapidly (within 5 minutes) with blister and V agents. Allow 10 to 15 minutes contact time for biological materials. Possible sources—commercial laundry (19 to 14 percent solution) or food store (5 percent solution such as Purex or Clorox®) Apply undiluted with brooms, brushes, or swabs. Preferred decontaminant for ship use. For ship use, a 5 to 1 concentration is recommended. Limited storage problem.	Undiluted, it is harmful to skin and clothing. Remove from skin and clothing by flushing with water. Corrosive to metals unless rinsed, dried, and lubricated after decon. Store in cool place.	No mixing required for chemical decon. For biological decon, dilute by adding 2 parts bleach to 10 parts water. For decon of cotton clothing and utensils, bleach should be diluted 1/2 cup bleach to 1 gal water. Dilute half and half with water and spray from PDDE.

Table A-2.—NonStandard Decontaminants—Continued

Decontaminant	Use	Remarks	Cautions	Preparation
Calcium Hypochlorite (HTH) (high test bleach, HTB, or high test hypochlorite) NSN 6810-264-6591 (25 lb) NSN 6810-664-0402 (100 lb)	Bio Cml	Effective against Lewisite, V agents, and all biological materials including bacterial spores. Reacts rapidly (within 5 minutes) with mustard and Lewisite. Allow 15 minutes contact time for biological materials. Faster acting than STB. Can be used as a dry mix or a slurry. Not recommended for ships. Top deck storage only. Not allowed in slurry or dry form in holds of vessels. Possible sources, commercial laundry, drug store, or chemical firm.	Observe same precautions as for STB. Pure undiluted calcium hypochlorite will burn on contact with VX, HD, or DS2. More corrosive than STB. Will destroy clothing, has a toxic vapor, and will burn the skin. Protective mask and rubber gloves are the minimum protective equipment for handling calcium hypochlorite. Skin or clothing that comes in contact with decontaminant should be flushed with large amounts of water. Equipment that has been used to spray decontaminant must be thoroughly cleaned after the spray mission (thoroughly rinse with hot water, 80°C or 176°F).	Chemical —Mix 5 lb decontaminant to 6 gal of water (10 percent solution). Biological —Mix 1 lb decontaminant to 6 gal water (2 percent solution). PDDE —Mix a slurry of 1 part decontaminant to 2 parts water (any heavier slurry will clog the decon apparatus). Use only if STB is not Available. A slurry of 3 parts HTH and 97 parts water can be used for horizontal surfaces. Approximate coverage is 1 gallon per 8 sq yd.
2-Propanone (acetone)	Cml	Melting point -95.35°C; boiling point 56.2°C. Evaporates rapidly. Good decontaminant for use in arctic regions. Commonly obtained as finger-nail-polish remover or paint thinners. Scrubbing increases effectiveness.	Extremely flammable. Does not neutralize agents. Effective for dissolving and flushing agent by physically removing.	None
Diethyl Ether	Cml	Melting point -116.2°C; boiling point 34.15°C. Good decontaminant for use in arctic regions. Available through medical supply facilities. Scrubbing increases effectiveness.	Same as 2-propanone.	Same as 2-propanone.
Ethylene Glycol	Cml	Contaminated surfaces should be scrubbed with decontaminant and thoroughly rinsed.	Effective in physically removing contamination, but does not neutralize the contamination. Runoff residue must be considered contaminated.	Mix 50 percent solution to 50 percent water.
Solvents (gasoline, JP-4, diesel fuel, kerosene, and similar solvents)	Cml	Contaminated surfaces should be scrubbed with decontaminant and thoroughly rinsed.	Same precautions listed for ethylene glycol are applicable to solvents. Solvents may damage materials such as rubber and plastic.	None

Table A-2.—NonStandard Decontaminants—Continued

Decontaminant	Use	Remarks	Cautions	Preparation
Sodium Hydroxide (caustic soda or lye) NSN 6810-174-6581 (100 lb)	Bio Cml	<p>Effective against G agents, lewisite, and all biological materials including bacterial spores.</p> <p>Neutralized G agents on contact. Allow to remain in contact with surface contaminated with chemical agent for approximately 15 minutes.</p>	<p>Damaging to skin, eyes, and clothing on contact in either solution or solid form.</p> <p>Inhalation of the dust or concentrated mist can cause upper respiratory or lung damage.</p> <p>Full rubber protective clothing, gloves, boots, and mask required.</p> <p>In case of contact, wash area immediately with large amounts of water, flush with diluted acetic acid or vinegar. Remove affected clothing immediately. If eyes are involved, flush them at once with large amounts of warm water and get medical attention.</p> <p>Runoff from decon operations is highly corrosive and toxic.</p> <p>Drain runoff into sump and bury.</p> <p>All equipment should be flushed with large amounts of clear water to minimize the danger of operators being burned by residual deposits.</p> <p>Not recommended for ship use. Top deck storage only.</p> <p>The M12A1 PDDE will withstand the highly corrosive action of caustic soda solutions. However, thorough rinsing after use is necessary.</p> <p>Corrosive to most metals.</p> <p>Effectiveness is directly proportional to strength of solution.</p> <p>Lye is not recommended as a decontaminant if less caustic decontaminants are available. Will cause a red-color change upon contact with M8 paper.</p>	<p>Small amount—10 lb lye to 12 gal water (10 percent solution).</p> <p>Mix in an iron or steel container (never aluminum, zinc, or tin).</p> <p>Add lye to water to prevent boiling and splattering due to excessive heat emitted.</p> <p>Do not handle mixing container with bare hands.</p> <p>Large amount—(PDDE use) Prepare a solution of 227 grams (1/2 lb) of lye for each gal of water. Pump 350 gal of water into tank unit. Connect tank unit and heater together. Heat water to 50°C (122°F). Disconnect heater unit and add 79 kg (175 lb) of lye (1-3/4 drums) to the heated water. Circulate solution with the pump unit until all lye is dissolved. The temperature will increase noticeably. Use while hot.</p> <p>Simultaneous mixing and applying—Sprinkle dry lye on the contaminated area and then dissolve it with a spray of steam or hot water. Do not wash. Do not wash the lye off the surface while applying the steam or hot water.</p> <p>Paint removal—1 lb lye per 2-1/2 gal of water is capable of removing an average coat of paint from about 11 sq yd of surface. This solution is effective in removing paint onto which chemical contamination has absorbed. (Calcium hydroxide, potassium hydroxide, or trisodium phosphate may be substituted for sodium hydroxide).</p>
Sodium Carbonate (washing soda, soda ash, sal soda, or laundry soda)	Cml	<p>Effective against G agents and CN. Reacts rapidly with G agents, normally within 5 minutes.</p> <p>Preferred decontaminant for ship use. Recommended 5 percent by weight concentrations. No storage problem.</p> <p>A hot solution is the most effective means of decontaminating CN.</p>	<p>Do not use for VX. It can not detoxify VX and creates extremely toxic by-products.</p> <p>HD does not dissolve in solution and is not detoxified.</p>	<p>Mix 10 lb washing soda to 12 gal water (10 percent solution).</p>
Potassium Hydroxide (caustic potash)	Bio Cml	<p>Same remarks applicable to sodium hydroxide apply to potassium hydroxide.</p>	<p>Same precautions applicable to sodium hydroxide apply to potassium hydroxide.</p>	<p>Same preparations as used for sodium hydroxide are used for potassium hydroxide.</p>

Decontaminant	Use	Remarks	Cautions	Preparation
Hexachloramelamine	Cml	Effective against mustard agents.	Protective mask and rubber gloves should be worn when working with hexachloramelamine. Corrosive to metal.	Decontaminant is a powder that is not soluble in water, but is soluble in organic solvents such as gasoline, kerosene, and paint thinner.
Ammonia or Ammonium Hydroxide (household ammonia)	Cml	Effective against G agents. Slower acting than sodium hydroxide or potassium hydroxide.	Self-contained breathing apparatus or special purpose mask required when working with ammonia or ammonium hydroxide.	Ammonium hydroxide is a water solution of ammonia. No further mixing is required.
Perchloroethylene (tetrachloroethylene)	Cml	Melting point -22°C; boiling point 121°C, good for use in arctic climates. A nonflammable, synthetic solvent widely used in dry cleaning plants. Dissolves H and V agents but not G. Low toxicity.	Physically dissolves and removes contamination but does not neutralize it.	No mixing required (practically insoluble in water). Effectiveness increased with scrubbing.
Dichloramine-B and Dichloramine-T	Cml	Effective against mustard agents.	Protective mask and rubber gloves should be worn when working with decontaminant. Corrosive to metal.	Decontaminant is a powder that is not soluble in water but is soluble in certain organic solvents. Normally mixed as a 10 percent solution in dichlorethane.
Acids (sulfuric acid, hydrochloric acid, acetic acid, oxalic acid, and similar acids)	Nuc	Effective solvents for rust and mineral deposits holding radioactive material on metal surfaces. Normally allow 1 hour contact time. Flush with water, scrub with a water-detergent solution, flush again with water.	Acids are difficult to handle. They are harmful to the body, particularly the eyes. Mixing acids or acid and water can produce boiling and splattering of the solution. Rubber boots, rubber gloves, rubber aprons, and goggles should be worn. Respiratory protection required in closed areas. In case of body contact with acid, flush area immediately with water. A 5 percent solution of water and baking soda (sodium bicarbonate) is used to wash acid from eyes and body. This solution neutralizes the acid.	None
Miscellaneous Solutions	Cml	To be effective, these solutions should be scrubbed onto the contaminated surfaces.	None	<p>MEA solution—10 percent monoethanolamine, 1.0 percent 9N9-nonionic surfactant (triton X100) in water</p> <p>WGD (C-8) solution—302 gal water, 250 lb HTH, 36 gal perchloroethylene, and 33 lb IHF emulsifier.</p> <p>ASH solution—0.2 percent pure Ca(OCl)₂ from STB in water buffered to a pH of 7.53 with NaH₂ HPO₄ and .05 percent triton X100 surfactant.</p> <p>Slash solution—aqueous hypochlorite salt, aqueous citric acid, sodium citrate buffer with detergent in equal proportion (pH 7.5).</p>

Table A-3.—Natural decontaminants.
(Decontaminants readily available and frequently occurring in nature.)

Decontaminant	Use	Remarks	Cautions	Preparation
Water	Nuc Bio Cml	Flush contamination from surfaces with large amounts of water.	Effective in physically removing contamination, but does not neutralize the contamination.	None
Steam	Nuc Bio Cml	The use of steam accompanied by scrubbing is more effective than the use of steam alone.	Effective in physically removing contamination. However, contamination may not be neutralized.	None
Absorbents (earth, sawdust, ashes, rags, and similar materials)	Cml	Used to physically remove gross contamination from surfaces.	The contamination is transferred from the surface to the absorbent. The absorbent becomes contaminated and must be disposed of accordingly. Sufficient contamination to produce casualties may well remain on surfaces.	
Sealants (concrete, asphalt, earth, paint, and similar materials)	Nuc Bio Cml	Used to physically seal in or shield contamination. Various sealants are effective as follows— • 12 inches of earth provides good protection from fallout (3 inches will reduce the dose rate by about one half). • 1 inch of asphalt or concrete completely absorbs alpha and beta radiation. • 1/4 inch of grout shields alpha and beta radiation. • Burying items contaminated with biological agents is an effective means of sealing off contamination. • 4 inches of earth provides good protection from chemical contamination	A break in the surface of the sealant will expose the contamination. Contaminated areas covered with sealants must be marked with appropriate NBC warning signs.	None

APPENDIX V

Decontamination of Specific Items

This appendix lists more than two dozen specific surfaces or materials, and explains briefly how to best decontaminate each for chemical, biological, or nuclear contamination. The best method of decon for a

particular surface or material in a given situation could be any of those listed for that surface or material. The order in which the methods are listed does not indicate preference of one over another.

Surface or Material	Type of Contamination		
	Chemical	Biological	Nuclear
Asphalt: Roads (Applicable to small vital areas only)	<ul style="list-style-type: none"> • Flush with water. • Spray with slurry from PDDE. • Cover with STB; when liquid contamination is visible and personnel are nearby, use dry mix. • Weather. • Cover small areas or paths across roads with 10 cm (4 inches) of earth. 	<ul style="list-style-type: none"> • Weather. (Remain masked). • Wet with water (will help prevent secondary aerosols, but does not decon). • Apply 2% household bleach solution. • Spray with slurry from PDDE. • Pour, spray, or spread oil on surface (will help prevent secondary aerosol, but does not decon). 	<ul style="list-style-type: none"> • Brush or sweep. • Flush with water (this may drive some of the contamination into the surface; waste must be controlled). • Vacuum cleaning.
Roofs	Same as for asphalt roads.	<ul style="list-style-type: none"> • Same as for asphalt roads. • Apply detrochlorite (leave on at least 30 minutes, then flush with water). 	Same as for asphalt roads.
Brick & Stone: Roads (Applicable to small vital areas only)	<ul style="list-style-type: none"> • Weather. • Spray with slurry from PDDE or apply with brushes and brooms. Let remain 24 hours, then flush with water. • Wash with soapy water, preferably hot. • Cover small areas or paths cross roads with 10 cm (4 inches) of earth. 	Same as for asphalt roads.	<ul style="list-style-type: none"> • Same as for asphalt roads. • Abrasion (sandblasting). This provides direct and complete removal of contaminated dust; however, sand and equipment being used becomes contaminated.
Buildings	<ul style="list-style-type: none"> • Spray with slurry from PDDE or apply with brushes and brooms. Let remain 24 hours, then flush with water. • Use STB or dry mix around buildings where wastewater runs. • Wash with soapy water, preferably hot. • Weather. 	<ul style="list-style-type: none"> • Same as for asphalt roads. • Apply STB slurry to vertical surfaces by manual means or PDDE. Slurry may be left on exteriors. 	Same as for brick and stone roads.
Concrete: Roads (Applicable to small vital areas only)	<ul style="list-style-type: none"> • Spray with slurry from PDDE. • Cover with STB or dry mix. • Weather. • Cover small areas or paths across roads with 10 cm (4 inches) of earth. 	Same as for asphalt roads.	Same as for brick and stone roads.

Surface or Material	Type of Contamination		
	Chemical	Biological	Nuclear
Buildings, bunkers, gun emplacements, tank obstacles	Same as for brick and stone buildings.	Same as for brick and stone buildings.	Same as for brick and stone buildings.
Earth: Roads (Applicable to small vital areas only), gun emplacements, bivouac areas, pathways, bomb craters	<ul style="list-style-type: none"> • Spray with slurry from PDDE. • Cover with STB; when liquid contamination is visible and personnel are nearby, use dry mix. • Weather. • Burn (may present downwind vapor hazard). • Cover small areas or paths across roads with 10 cm (4 inches) of earth. • Scrap layer of contaminated earth to side or road. 	<ul style="list-style-type: none"> • Same as for asphalt roads • Burn. 	<ul style="list-style-type: none"> • Earthmoving (removal). Contaminated dust should be controlled. Equipment may become contaminated. Waste disposal must be considered. • Sealing (with earth). No waste disposal problem; however, equipment may become contaminated.
Fabrics: Canvas, covers, tarpaulins, tentage, mask carriers, web gear, clothing	<p>Cotton</p> <ul style="list-style-type: none"> • Immerse in boiling soapy water for 1 hr (1 lb soap to 10 gal water); stir. • Use 5% solution of sodium carbonate for G agents. <p>Immerse in boiling water for 1 hr.</p> <ul style="list-style-type: none"> • Launder by standard methods. • Use slurry. • Weather (except for V agents). <p>Woolen (DS2 not recommended)</p> <p>Immerse in warm (100°F, soapy water for 1 hr or longer with light agitation; dry items slowly (fabric may shrink)).</p>	<p>Cotton</p> <ul style="list-style-type: none"> • Boil in water for 15 minutes. • Autoclave for 45 minutes at 123°C (253°F). • Immerse in 2% household bleach solution for 30 minutes, rinse immediately. • Launder (destroys or inactivates all but highly resistant spores). <p>Woolen (DS2 not recommended).</p> <p>Launder (fabric may shrink).</p>	<p>Cotton and Woolen (DS2 not recommended for woolen).</p> <ul style="list-style-type: none"> • Brushing (removes contaminated dust, but presents dust hazard to personnel). • Laundering (most practical procedure; waste must be controlled; fabric may shrink).
Leather: Boots, gloves, and other items	<ul style="list-style-type: none"> • Scrub with hot, soapy water and rinse. • Immerse in soapy water at 120°F for 4 hrs and rinse. • Use 5% sodium carbonate solution for G agents. • Air. 	<ul style="list-style-type: none"> • Immerse in 2% household bleach solution. Rinse. • Immerse in 2% peracetic acid for 10 minutes, rinse, and air for 10 to 50 minutes. • Wipe with 2% peracetic acid, remove excess, and air 10 to 15 minutes. 	<ul style="list-style-type: none"> • Brushing • Flushing with water or soapy water.
Glass: Windows	<ul style="list-style-type: none"> • Decon kit, individual equipment. • M258A1 or M280 kit. • DS2. • Wash with hot, soapy water. • Wash with clear water or organic solvent. • Blot off surface. • Air. • Weather. 	<ul style="list-style-type: none"> • M258A1 or M280 kit. • Wash with soap and water. • Wipe with disinfectant solution or 2% peracetic acid (see similar procedures below for mess gear). 	<ul style="list-style-type: none"> • M258A1 or M280 kit. • Wash with detergent. • Flush with water. • Wipe with solvents.
Lenses	<ul style="list-style-type: none"> • M258A1 or M280 kit. • Same as for windows (DS2 may damage lens coatings). • Decon kit, individual equipment. 	<ul style="list-style-type: none"> • M258A1 or M280 kit. • Wipe with soap and water. • Wipe with alcohol or household bleach. 	<ul style="list-style-type: none"> • M258A1 or M280 kit. • Brush or wipe (care must be exercised to prevent scratching of lens). • Use compressed air to blow contamination from surface.

Surface or Material	Type of Contamination		
	Chemical	Biological	Nuclear
Grass and low vegetation: Fields, open terrain	<ul style="list-style-type: none"> • Burn. • Spray with slurry from PDDE. • Cover with STB or dry mix. • Explode drums of STB. • Clear paths through area by use of detonating cord or other detonating devices. 	<ul style="list-style-type: none"> • Burn. • Same as for asphalt roads 	Same as for earth.
Metals (unpainted): Ammunition	<ul style="list-style-type: none"> • Wipe with soapy water. • Wipe with organic solvent and dry. • Air. 	<ul style="list-style-type: none"> • Wipe with soapy water. • Wipe with 2% household bleach solution. • Air. 	• Brush or wipe.
Machinery	<ul style="list-style-type: none"> • Use DS2. • Same as for ammunition. 	<ul style="list-style-type: none"> • Use DS2. • Wipe with 2% peracetic acid, rinse, and air for 10 to 15 minutes. 	<ul style="list-style-type: none"> • Brush or wipe. • Wash with detergent. • Flush with water.
Mess gear and canned rations	<ul style="list-style-type: none"> • Immerse in boiling, soapy water for 30 minutes and rinse. • Immerse in boiling water for 30 minutes. • Spray with DS2. • Wash in hot, soapy water, rinse, and air. 	<ul style="list-style-type: none"> • Wash with soap and water, then immerse in disinfectant solution (disinfectant, chlorine, food service, or 1/3 canteen cup of household bleach per 10 gal water). • Boil in water 15 minutes. (Not effective on toxins and bacterial spores). Immerse in 5% sodium carbonate (4 lb washing soda to 10 gallons water), rinse with potable water. • Immerse in household bleach solution (1 1/2 gal bleach to 25 gal water) for 30 minutes, then rinse and air for 10 to 15 minutes. • Immerse in HTH solution (1/2 lb to 25 gal water) 30 minutes, then rinse. • Immerse in STB solution (1 lb to 25 gal water) for 30 minutes, then rinse. • Immerse in 2% peracetic acid for 10 minutes, rinse, and air for 10 to 15 minutes. 	<ul style="list-style-type: none"> • Wash with soap and water, rinse. • Brush, wipe contamination from surfaces and containers.
Metals (painted): Vehicles, weapons, equipment	<ul style="list-style-type: none"> • DS2 (may soften paint). • Wash with hot, soapy water and rinse. • Spray with slurry from PDDE, remove from surface in 1 hour and oil surface. • Weather. • Air. • M291 kit may be used for individual weapon decon. • M280 (DKIE) decon kit, individual equipment. 	<ul style="list-style-type: none"> • Wash with detergent and high-pressure water stream. • Apply detrochlorite. Leave on 30 minutes, then remove by washing with a stream of water. • Steam clean, using detergent. • Use household bleach solution. • Use 2% peracetic acid. 	<ul style="list-style-type: none"> • Brush or wipe. • Wash. • Use organic solvents, caustics (not on aluminum or magnesium surfaces), complexing agents (of small value on weathered surfaces), or abrasives.

Surface or Material	Type of Contamination		
	Chemical	Biological	Nuclear
Plastics (opaque): Insulation, telephones, panel boards.	<ul style="list-style-type: none"> • DS2 (may soften or damage some plastics). • Wash with hot, soapy water and rinse. • Weather. • Air. 	Same as for lenses	<ul style="list-style-type: none"> • Wash with detergents. • Flush with water. • Wipe or brush.
Plastics (transparent): Eyepieces, airplane canopies	<ul style="list-style-type: none"> • Wash with hot, soapy water and rinse. • Weather. • Air. • Blot off surface. 	Same as for lenses	Same as for plastics (opaque).
Rubber (impermeable): Aprons, suits, and other items	<ul style="list-style-type: none"> • Spray with DS2 and rinse after 30 minutes. • Immerse in hot, soapy water (just below boiling point) for 1 hour; do not agitate. Rinse with clear water and hang up to dry. • For G agents, use 10% sodium carbonate solution, rinse, and air. • Apply hot, soapy water with brushes and rinse. • Spray with slurry from PDDE. • After a few minutes, wash off with clear water. 	Same as for leather.	<ul style="list-style-type: none"> • Brushing. • Scrubbing or flushing with water or soapy water.
Rubber (natural and synthetic): Gloves, boots	<ul style="list-style-type: none"> • Spray with 10% mixture of HTH and rinse. • Immerse in slurry solution for 4 hours, rinse, and air. • Use the M291 kit in emergencies. • AIR. 	Same as for leather.	Same as for impermeable rubber.
Mask facepieces and other rubber articles coming in direct contact with the skin.	<ul style="list-style-type: none"> • USE the M291 kit in emergencies. • Wash with warm, soapy water, • Use decon kit, individual equipment, M280. 	<ul style="list-style-type: none"> • Wash in warm, soapy water; rinse in clear water, and dry at room temperature. • Wipe with 2% peracetic acid; wipe off excess immediately, and air 10 to 15 minutes. 	<ul style="list-style-type: none"> • Wipe or brush off. • Wipe off with water and detergent (avoid wetting mask filters).
Tires, hoses, mats, insulation.	<ul style="list-style-type: none"> • Spray with 10% mixture of HTH and rinse. • Apply slurry paste. Allow slurry to remain at least 30 minutes, then flush with clear water (may be left on tires). • Apply hot, soapy water. • Air. • Weather. 	Use same methods used for chemical decon.	Same as for impermeable rubber.
Sand (Applicable to small vital areas only): Beaches, deserts.	<ul style="list-style-type: none"> • Flush with water. • Spread STB or spray slurry over surface. • Weather. • Cover paths with roofing paper. • Scrape off 5 to 10 cm (2 to 4 inches) of contaminated top layer. 	<ul style="list-style-type: none"> • Burn. • Wet with water (will help prevent secondary aerosols, but does not decon). • Apply 2% household bleach solution. • Apply slurry of 7 parts STB and 93 parts water (by weight). • Apply sodium hydroxide. 	Same as for earth.

Surface or Material	Type of Contamination		
	Chemical	Biological	Nuclear
Undergrowth and tall grass: Meadows, jungles, forests (Applicable to small vital areas only)	<ul style="list-style-type: none"> • Burn (downwind vapor hazard). • Spray slurry from PDDE. • Weather. • Explode drums of STB. • Clear paths with detonating cord, bangalore torpedoes, or demolition snakes: 	<ul style="list-style-type: none"> • Burn. • Same as for sand. 	To extent possible, use same procedures as for earth.
Wood (unpainted) Buildings, vehicle bodies, boxes, crates, and similar items	<ul style="list-style-type: none"> • Apply slurry with PDDE, brooms, or swabs. Let slurry remain 12 to 24 hours; flush and repeat application, then flush again. • Scrub with hot, soapy water and rinse. • Weather. 	<ul style="list-style-type: none"> • Apply detrochlorite. Leave on at least 30 minutes; flush with water. • Apply STB slurry to vertical surfaces. Slurry may be left on interiors. • Weather (sun and rain eliminate most microorganisms within one day). • Burn. 	<ul style="list-style-type: none"> • Planning. • Wash exterior with large amounts of water (some contamination may soak into surfaces).
Wood (painted surface): (DS2 may soften paint). Buildings, boxes	<ul style="list-style-type: none"> • Apply slurry with PDDE, brooms, or swabs. Let slurry remain 12 to 24 hours then rinse off with water. • Scrub with hot water and rinse. Use DS2 and rinse. • Weather. 	Same as for wood buildings and boxes as previously indicated.	<ul style="list-style-type: none"> • Wash exterior with large amounts of water. • Wipe contamination from surface.
Water	Decon of water should only be undertaken by trained water purification personnel.	<ul style="list-style-type: none"> • Boil small amounts 15 minutes. • Chlorinate using chlorination kit. • Add iodine water purification tablets to small amounts of water. 	<ul style="list-style-type: none"> • Flocculation (requires special chemicals to remove suspended matter in water). • Ion exchange (removes radioions from solution).
Food: Not canned or protected by impermeable container	Food known or suspected to be contaminated with chemical agents should not be consumed until approved by veterinary personnel.	<ul style="list-style-type: none"> • Boil in water 15 minutes. Cook thoroughly. • Immerse in or spray with 2% household bleach solution. (Pack aged food or food which is peeled or pared may be immersed or sprayed). 	Wash or trim contamination from unpackaged food.
Food: Canned, bottled, or protected by impermeable container	See mess gear and canned rations.	See mess gear and canned rations.	See mess gear and canned rations.
Personnel	<ul style="list-style-type: none"> • Use M291 kit on exposed skin known or suspected to be contaminated; decon kit individual equipment, M280. • Bathe with soap and water if readily available. 	<ul style="list-style-type: none"> • Bath with soap and hot water; decon kit individual equipment, M280. • Use the M291 kit. 	<ul style="list-style-type: none"> • Brush or wipe from skin and hair. • Bathe with soap and hot water.

APPENDIX VI

Work/Rest Table

Stations and Work Load					
Temperature	1-Wash	2-Decon Appl.	3-Wait/ Interior	4-Rinse	5-Check
	Moderate	Heavy	Moderate	Moderate	Light
Cool (<68°F) (<20°C)	60 Work 0 Rest	30 Work 30 Rest	60 Work 0 Rest	60 Work 0 Rest	60 Work 0 Rest
Warm (68°F-74°F) (20°C-24°C)	45 Work 45 Rest	20 Work 20 Rest	45 Work 45 Rest	45 Work 45 Rest	50 Work 50 Rest
Hot (77°F-84°F) (25°C-29°C)	30 Work 60 Rest	15 Work 30 Rest	30 Work 60 Rest	30 Work 60 Rest	40 Work 80 Rest
Very Hot (84°F) (29°C)	20 Work 60 Rest	10 Work 30 Rest	20 Work 60 Rest	20 Work 60 Rest	25 Work 75 Rest

When operating in temperatures above 75°F, you should consider the ability of the troops to accomplish the mission. Once the troops have reached their maximum work load for heat stress, they can not recover quickly enough to accomplish the decon mission. A viable option is to postpone the decon operation until a cooler part of the day or evening. This will reduce the heat stress load on troops and increase the probability of mission success.

APPENDIX VII

ACRONYMS

ACE	Aviation Combat Element
AO	Area of Operations
BLT	Battalion Landing Team
BSSG	Brigade Service Support Group
CARC	Chemical agent resistant coating
CE	Command Element
CEOI	Communication Electronics Operating Instruction
COC	Combat Operations Center/Commaud
CSS	Combat Service Support
CSSE	Combat Service Support Element
CSSOC	Combat Service Support Operations Center
DAP	Decontaminating apparatus
DASC	Direct Air Support Center
DECON	Shortened form of decontamination
DED	Detailed equipment decon
DKIE	Decon kit, individual equipment
DTD	Detailed troop decon
FDC	Fire Direction Center
FMFM	Fleet Marine Force Manual
FSC	Fire Support Coordination/Coordinator
FSSC	Fire Support Coordination Center
FSSG	Force Service Support Group (USMC)
GCE	Ground Combat Element
GPM	Gallons per minute
LDS	Lightweight decontaminating system
LP	Listening Post
MAF	Marine Amphibious Force
MAGTF	Marine Air-Ground Task Force
MAU	Marine Amphibious Unit
MAW	Marine Aircraft Wing
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force

MEU	Marine Expeditionary Unit
MGX	MOPP gear exchange
MOPP	Mission-oriented protective posture
MSR	Main Supply Route
MSSG	Marine amphibious unit service
OP	Observation Post
OPLAN	Operational Plan
PDDA	M12A1 power-driven decon apparatus
OPSEC	Operations Security
PDDE	Power-driven decon equipment
SD	Skin decontamination
STB	Supertropical bleach
SOP	Standing operating procedures
TOA	Table of Allowance

APPENDIX VIII

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