



DEPARTMENT OF THE NAVY  
HEADQUARTERS UNITED STATES MARINE CORPS  
2 NAVY ANNEX  
WASHINGTON, DC 20380-1775

MCO 6200.1E  
SD  
6 Jun 2002

MARINE CORPS ORDER 6200.1E W/CH 1

From: Commandant of the Marine Corps  
To: Distribution List

Subj: MARINE CORPS HEAT INJURY PREVENTION PROGRAM

Ref: (a) MCO 3500.27A  
(b) MCO P5102.1A  
(c) BUMEDINST 6220.12A  
(d) NAVMED P-5010, Manual of Naval Preventive Medicine, Chapter 9, Section V, Prevention of Heat Injuries  
(e) MCO 1510.89A, Marine Corps Common Skills Handbook

Encl: (1) Understanding Heat Injuries  
(2) An Example of SOP on Unit Physical Training and Operations in Hot Environments  
(3) The Wet-Bulb Globe Temperature (WBGT) Index System  
(4) Heat Condition Flag Warning System  
(5) Fluid Replacement Guidelines for Warm Weather Training

1. Situation. To provide policy, assign responsibility, and establish instructions for implementation of the Marine Corps Heat Injury Prevention Program.

2. Cancellation. MCO 6200.1D.

3. Mission. Commanders at all levels are responsible for the planning and execution of command-sponsored heat injury prevention program.

4. Execution

a. Commander's Intent and Concept of Operations

(1) Commander's Intent

(a) This Order is applicable to all Marine Corps commands responsible for the oversight, administration, or conduct of operations or mandated physical training (PT) during the hot weather season and hot weather operational environments. It shall meet the requirements of references (a) through (d) as applicable. In addition, safety training, the need for standard operating

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procedures (SOPs), and mishap reporting and investigation requirements for all mishaps shall be in accordance with references (a) and (b) and the guidance provided in enclosure (1) of this Order.

(b) Commanders and commanding officers will implement this Order including the requirements of references (a) through (d) as applicable. Local policies and orders may be implemented when those policies are of equal or more stringent guidance.

(c) All Marines will use operational risk management for all (PT) exercises and hot weather operations. Example of SOP is provided at enclosure (2).

## (2) Concept of Operations

(a) Inspect and evaluate all hot weather-related operations and training activities to provide the greatest degree of inherent safety within the facility and minimize heat injuries.

(b) Assess the hazards and risks presented by the activity or facility; determine controls and implement controls.

(c) Ensure safety requirements are embedded in the operating procedures, and training includes the controls to minimize mishaps or to halt the activity or operation when unsafe conditions exist.

(d) Provide training to personnel that is conducted in accordance with an approved curriculum. Include basic safety training for the activity or evolution to be conducted.

(e) Ensure training and education are obtained from medical personnel, per reference (d). Become familiar with the causes, types, prevention, and emergency treatment of heat injury. Ensure all personnel under your cognizance receive initial and annual refresher heat injury prevention training, per reference (e).

(f) Conduct heat injury prevention training any time the commander deems necessary.

(g) Conduct training using qualified medical personnel and include the types, causes, prevention, and emergency treatment of heat casualties. Training shall also include explanation of

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the heat index, use of the wet-bulb globe temperature (WBGT) and accompanying flag warning system.

b. Subordinate Element Missions

(1) Director, Safety Division (CMC(SD)). Administer the requirements and ensure the accuracy, modification, and distribution of this Order.

(2) Commanders and Commanding Officers. Comply with the intent of the enclosures and content of this Order.

(3) Unit Leaders, SNCOs/NCOs. Provide fluid replacement for personnel. Schedule intermittent rest periods with water breaks. Ensure that personnel use guidelines for warm weather training. Ensure personnel who are ill or taking medication or dietary supplements report to medical department. Refer individuals with prior heat illness to medical personnel for evaluation of their fitness to participate in PT or any hot weather operation or activity. Ensure individuals found unfit are released from PT or any hot weather operation or activity following appropriate chain of command without fear of reprisal. Enclosure (2) provides an example of local unit SOP for PT and operations in hot environments.

c. Coordinating Instructions

(1) Ensure that the heat injury prevention program reflects command presence and leadership initiatives.

(2) Provide adequate staff and budget to administer this program. When the command is present as a tenant aboard an installation, the installation command shall accomplish this mission, and the tenant will be in compliance with the installation order. The tenant may develop its own policy as long as that policy meets or exceeds the installation policy. This policy shall address the requirements outlined in enclosure (1) as applicable.

(3) Use the standard WBGT heat index as described in enclosure (3), provide the readings to subordinate commands, and post appropriate heat index flags as described in enclosure (4).

(4) Ensure annual heat injury awareness training and education is obtained from medical personnel, per reference (d).

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(5) Submit all recommendations concerning this Order to CMC (SD) via the appropriate chain of command.

(6) Ensure that all heat illnesses are reported in accordance with references (b) and (c).

5. Administration and Logistics. Safety officers, safety managers, specialists, and civilian supervisors will provide the requirements of this Order to local and tenant organizations.

6. Command and Signal

a. Signal. This Order is effective the date signed. Prior to implementation of this policy, activities must, where applicable, discharge their labor relations obligations. Assistance and guidance may be obtained from CMC (MPO-37).

b. Command. This Marine Corps Order is applicable to the Marine Corps Total Force.



M. J. WILLIAMS  
Assistant Commandant  
of the Marine Corps

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CHANGE 1 TO MCO 6200.1E, MARINE CORPS HEAT INJURY PREVENTION

MARADMIN 334/03

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Date signed: 07/23/2003 MARADMIN Number: 334/03 R 231500Z JUL 03

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SUBJ/CHANGE 1 TO MCO 6200.1E, MARINE CORPS HEAT INJURY PREVENTION  
/PROGRAM//

REF/A/DOC/CMC SD/-/6 JUN 02//

AMPN/REF A IS MCO 6200.1E, MARINE CORPS HEAT INJURY PREVENTION  
PROGRAM//

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GENTEXT/REMARKS/-//

RMKS/1. PURPOSE. THIS MARADMIN DIRECTS PEN CHANGES TO THE BASIC  
ORDER. 2. BACKGROUND

A. IN ENCLOSURE (5) OF THE REF, THE WORK/REST CYCLE OF TABLE 5-1,  
FLUID REPLACEMENT GUIDELINES FOR WARM WEATHER TRAINING, HAS BEEN  
PERCEIVED AS BEING "PRESCRIPTIVE." THE INTENT OF THE ORDER IS TO  
PROVIDE COMMANDERS APPROPRIATE GUIDANCE AND TOOLS TO PLAN AND  
EXECUTE PHYSICAL TRAINING AND ESSENTIAL ACTIVITIES DURING INCREASED  
HEAT INDEX CONDITIONS.

B. THIS CHANGE CLARIFIES AND REINFORCES THE NEED FOR COMMANDERS TO  
APPLY THE WORK/REST CYCLE UNDER THE VARIOUS FLAG CONDITIONS AS A  
"GUIDE" FOR DECIDING THE LEVEL, CRITICALITY, AND EXECUTION OF  
PHYSICAL TRAINING CONDUCTED DURING INCREASED HEAT INDEX CONDITIONS.  
DURING ALL PERIODS OF HIGH HEAT INDEX CONDITIONS, COMMANDERS WILL  
APPLY APPROPRIATE RISK MANAGEMENT PRINCIPLES THAT ENSURE ADEQUATE  
WATER AND NUTRITIONAL INTAKE AND REST PERIODS. TRAINING WHICH  
EXCEEDS THE GUIDELINES CONTAINED WITHIN TABLE 5-1 WILL REQUIRE  
MITIGATING ACTIONS (E.G., LIVE FIRE - SHORTENING LENGTH OF ATTACK;  
TACTICAL MOVEMENTS - REDUCE USE/QUANTITY OF BODY ARMOR, ETC).

3. ACTION. IN ENCLOSURE (1), PAGE 3, PARAGRAPH 6C, DELETE THE  
FIRST SENTENCE AND REPLACE IT WITH THE FOLLOWING TEXT:

"TABLE 5-1 OF ENCLOSURE (5) PROVIDES COMMANDERS A GUIDE FOR DECIDING  
THE LEVEL, CRITICALITY, FLEXIBILITY AND EXECUTION OF PHYSICAL  
TRAINING CONDUCTED DURING INCREASED HEAT INDEX CONDITIONS. IF A  
COMMAND MUST EXCEED THE TRAINING CONDITION GUIDELINES CONTAINED IN  
THIS ORDER TO ACCOMPLISH MISSION ESSENTIAL TASKS, THAT COMMAND WILL  
HAVE ESTABLISHED PROCEDURES TO DO SO. COMMANDERS, IN CONCERT WITH  
LOCAL MEDICAL AUTHORITIES, WILL DEVELOP AND APPROVE STANDING  
OPERATING PROCEDURES (SOP) FOR THOSE OCCASIONS. THE SOP WILL  
CONTAIN RISK MANAGEMENT PRINCIPLES AND INDICATE HOW THE INCREASED  
HEAT INJURY RISK WILL BE ASSESSED AND ADDRESSED. MEASURES WILL  
INCLUDE, BUT ARE NOT LIMITED TO, INCREASED COMMAND SUPERVISION,  
COMMAND SUPPORT, AND INCREASED SUPPORT AND PREPARATION BY LOCAL  
MEDICAL PERSONNEL."

4. THIS CHANGE IS EFFECTIVE IMMEDIATELY AND IS APPLICABLE TO MARINE  
CORPS ACTIVITIES ON PCN 10209380000 DISTRIBUTION.

5. FILING INSTRUCTIONS. FILE THIS CHANGE IMMEDIATELY FOLLOWING THE  
SIGNATURE PAGE OF THE BASIC ORDER.//

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## UNDERSTANDING HEAT INJURIES

1. Heat Injuries

a. Heat injuries may occur during physical training (PT) or any hot weather operation or activity, when an individual: (1) is not properly hydrated and/or acclimatized; (2) is exposed to extreme heat; (3) is in Mission-Orientated Protective Posture (MOPP) gear or other personal protective clothing required by the job; (4) is inside closed spaces, such as inside an armored vehicle, or (5) wears body armor. Other contributing factors include previous heat injury, alcohol consumption, use of dietary supplements, fatigue, and skin trauma (i.e., sunburn).

b. Heat injury can be divided into three categories: heat cramps, heat exhaustion, and heat stroke. Any personnel (military or civilian) trained in heat injury prevention must be able to:

- (1) Prevent or minimize heat injuries. PREVENTION IS KEY.
- (2) Recognize and give first aid for heat injuries.
- (3) Check personnel for signs and symptoms of heat injuries.

2. Heat Cramps. Heat cramps are painful cramps of muscles, usually in the stomach, legs, and/or arms. They are caused by loss of electrolytes in the body due to excessive sweating. Heat cramps may occur without the individual feeling thirsty. See table 1-1 of this enclosure for signs and symptoms and first aid measures.

3. Heat Exhaustion. In NAVMED P-5010, this condition is defined as resulting from peripheral vascular collapse due to excessive water and salt depletion. Symptoms include profuse sweating, headache, weakness, pallor, nausea, vomiting, mild dyspnea (shortness of breath), and palpitations. The casualty may become faint and lose consciousness. The blood pressure may be low, the body temperature may be elevated or normal, and the pupils may be dilated. It can occur in an otherwise fit individual involved in PT or any hot weather operation or activity especially if the person is not acclimatized to that environment. If ice packs are available, use them. Put them in arms, armpits, and neck. See table 1-1 of this enclosure for signs and symptoms and first aid measures.

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4. Heat stroke. This is a medical emergency that may result in death if care is delayed. It is typically defined as a core temperature greater than 105 degrees Fahrenheit or any change in mental status of an affected individual with any elevated core temperature. It is caused by a failure of the body's ability to maintain optimum core body temperature (cool itself). It occurs more rapidly in personnel who are engaged in work or other PT in a high heat environment than those not physically engaged. If ice packs are available, use them. Put them in arms, armpits, and neck. See table 1-1 of this enclosure for heat injury, signs and symptoms, and first aid. Heat stroke requires immediate evacuation to a higher level of care.

5. Treatment. Medical care and treatment are provided in accordance with NAVMED P-5010. Battalion aid stations will be prepared to treat cases of heat injury. Artificial cooling devices should be employed at treatment stations and in ambulances.

6. Prevention. The three major ways of preventing heat injury are: (1) hydration; (2) wet-bulb globe temperature (WBGT) monitoring and appropriate work/rest cycles; and (3) acclimatization. Remember that removing camouflage or other utility uniforms may increase the chance of sunburn. Provide shade or move individual to shade. In a hot environment and during periods of heavy work, thirst is not a reliable indicator of the body's need for water. Do not use sports drinks as a sole source of hydration. Sport drinks are helpful in replacing fluids and nutrients lost during times of heavy work activity, but cold water is adequate in most situations. Use the fluid replacement guidelines in enclosure (5). Incidence of heat injury recurrence is higher in individuals who have already suffered from a single episode of exposure than those who have not. Leadership must ensure annual heat injury awareness training and education is obtained from medical personnel, per NAVMED P-5010. Proper training and awareness of health risks will minimize heat-related injury/fatality.

a. Hydration. Proper hydration is a process that begins 24 to 48 hours in advance of long marches or working in high-humidity environments. If a unit knows it will engage in activities that require high hydration, it should enact a unit hydration protocol which: prohibits alcohol intake prior to the activity; prohibits the use of dietary/muscle building supplements prior to the activity; encourages consumption of low to moderate

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amounts of cool water evenly spaced over the 24-hour day; prohibits cardiovascular exercise in excess of 30 minutes, 24 hours prior to activity (to minimize fluid loss and muscle fatigue which can in turn minimize musculoskeletal injuries); and ensure annual heat injury awareness training and education are obtained from medical personnel, per NAVMED P5010.

(1) Drink fluids frequently in accordance with enclosure (5). Infrequent, large intakes, may lead to stomach distention, vomiting or cardiac problems. Fluid losses should be replaced hour by hour as opposed to salt losses that can be adequately replaced with a salty diet on a daily schedule. Fluid needs may range from 2 quarters in a garrison situation to 3 gallons a day when consuming field rations and performing heavy work in a hot environment. Ideally, individuals should drink 13 to 20 ounces of cool water 10 to 20 minutes before exercise/work in the heat. This procedure, however, does not replace the need for continual fluid replacement and is not as effective in maintaining thermal balance as consuming an equal volume of cool water during exercise or work. Drink cool water until urine turns very pale yellow. Some foods and prescription drugs may darken urine. Seek medical evaluation if you drink proper amounts of water and your urine color is consistently dark yellow.

(2) An individual who gets sick or dizzy in hot weather should rest. DON'T OVERDO - AVOID A PREVENTABLE HEAT INJURY.

b. WBGT Monitoring. See enclosure (3) for information on equipment installation, frequency of monitoring, WBGT Logs, and setup of WBGT Station. The WBGT index is a good indicator of external heat stress on the body. It is most useful in the traditional settings (long-forced marches or mid-day training) under which it was developed. Since the advent of high intensity early morning or late-day physical activity, its usefulness to predict early morning PT heat casualties is reduced. This tool determines flag conditions and work/rest cycles. The WBGT readings must be taken in an unshaded location that best represents the actual training location. It works by incorporating the effects of air velocity and humidity (wet bulb), air temperature (dry bulb), and radiant heat (globe temperature).

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c. Work/Rest Cycles. Table 5-1 of enclosure (5) provides commanders a guide for deciding the level, criticality, flexibility and execution of physical training conducted during increased heat index conditions. If a command must exceed the training condition guidelines contained in this Order to accomplish mission essential tasks, that command will have established procedures to do so. Commanders, in concert with local medical authorities, will develop and approve standing operating procedures (SOP) for those occasions. The SOP will contain risk management principles and indicate how the increased heat injury risk will be assessed and addressed. Measures will include, but are not limited to, increased command supervision, command support, and increased support and preparation by local medical personnel. These guidelines apply to the average

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acclimatized individual wearing camouflage/utility uniforms in hot weather. For example, when performing moderate work, as shown in table 5-1 of enclosure (5), schedules will call for a 10-minute break every hour when the flag condition is green and the WBGT is between 80 to 84.9 degrees Fahrenheit. The hour immediately after the noon and evening meals should be devoted to relaxation or non-strenuous training. Seven hours of sleep per 24-hour period is the minimum required for general efficiency. Table 5-2 of enclosure (5) shows work examples.

d. Acclimatization. Acclimatization is the ability of the body to undergo physiological adaptations to function in a hot environment. NAVMED P-5010, article 9-35 states, "A period of 3 weeks is optimal for acclimatization, with progressive degrees of heat exposure and physical exertion." A minimum of 2 weeks is necessary for the acclimatization process. Chapter 3 of NAVMED P-5010 recommends 22 days for hot humid environments.

(1) Acclimatization to heat involves repeated exposure to heat, sufficient to raise the core body temperature by at least 1 degree Celsius and to induce moderate to profuse sweating. A climate-specific heat injury prevention program must include a differentiation between dry heat and humid heat. Commands should modify the guide provided in enclosure (2) to reflect specifics of climatic conditions in their geographic locations.

(2) During the first 2 days of heat exposure, light activities are appropriate.

(3) By the third day of heat exposure, 3 km runs at the pace of the slowest individual are possible.

(4) Heat acclimatization takes at least 14 days with carefully supervised exercise for 2 to 3 hours daily in the heat.

(5) The intensity of exercise should be gradually increased each day, working up to an appropriate PT schedule adapted for the environment.

(6) PT should be conducted in the morning or evening, during cooler hours. Commands should modify this guide to reflect specifics of climatic conditions in their geographic locations.

(7) Newly enlisted, reservists, and transferred military personnel are generally not acclimatized adequately to hot

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environments and strenuous workloads, which make them have a higher risk for heat injuries. As a part of their check-in, they should be medically screened for susceptibility to heat injury and degree of acclimatization prior to being assigned to perform their duties in a hot and humid environment.

(8) Physically fit personnel can adapt more rapidly than the less fit.

## 7. Avoiding a Heat Injury

a. Drink fluids frequently in accordance with enclosure (5).

b. Avoid salt tablets unless prescribed by, and under the supervision of, a licensed physician. NAVMED P-5010 provides guidance on the proper use of salt tablets. Use of alcohol, lack of sleep, poor physical condition, lack of muscle tone, and obesity can increase an individual's susceptibility to heat. Individuals who use certain over-the-counter drugs, prescription medications, and dietary supplements, are more susceptible to heat-related injuries. Consult with command medical personnel before taking a dietary supplement, to include products containing creatine, ephedra (ma huang), performance enhancing drugs, or energy boosters. Many supplements do not have Food and Drug Administration approval and can affect rates of fluid intake available to the tissues for rehydration. Also, inform medical personnel of any known family history of heart disease, high blood pressure, diabetes, asthma, or prior history of heat related fainting or illness.

c. If individuals stop sweating, they must get immediate medical attention.

d. Some foods and prescription drugs may alter the color of urine. Consult with medical personnel on these issues.

## 8. Training and Education

a. Newly enlisted or transferred military personnel shall receive heat stress and awareness training prior to deployment into hot, dry, and humid environments. They shall receive the training locally from medical personnel serving their command. The training shall include the types, causes, symptoms,

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treatment, and prevention of heat injuries, per Common Skills Handbook.

b. PT programs for individuals who are not acclimatized should be limited in intensity and time. Enclosure (5) provides a guideline for maximum work times and work/rest periods. During the breaking-in period of 2 to 3 weeks, the workload should be increased gradually but not to the point of exhaustion. Until acclimatized, personnel will lose greater than normal quantities of water and salt. These losses must be replaced. Although acclimatization increases tolerance for heat, it does not make an individual immune from suffering a heat injury.

c. Individuals who are overweight or have problems with sweating and/or blood circulation and individuals who have suffered prior heat-related injuries are more susceptible to another, usually more serious, heat injury. Refer individuals for medical attention: (1) who have experienced previous illness; (2) who currently are ill or recovering from an acute or chronic disease; (3) who are using health or muscle building supplements; and (4) who take over-the-counter drugs or prescription medications.

9. Effects of Clothing on Military Operations. Military personnel who wear MOPP gear should be aware that the addition of MOPP gear and other equipment can substantially increase the risk of heat injury even in physically fit, acclimatized, and well-hydrated individuals. Enclosure (5) contains fluid replacement guidelines for warm weather training. Local commanders and unit leaders will use these guidelines when they plan training that involves heightened physical activity and the wearing of additional layers of uniform.

10. Prior to a hot weather exercise/operation, individuals who: are overweight, dieting; have suffered prior heat injuries; have returned to duty shortly after giving birth; are recovering from an illness; have history of heart disease; or who are taking medications should be medically evaluated for fitness to participate in PT or any hot weather operation or activity. These individuals should be identified and continually monitored by their supervisors and medical department personnel.

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SIGNS/SYMPTOMS	FIRST AID
Heat Cramps: Muscle cramps of the arms, legs, and/or stomach and excessive sweating.	<ol style="list-style-type: none"> <li>1. Move individual to a cool shady area or improvise shade; loosen clothing.</li> <li>2. Monitor the individual and give water as tolerated; should slowly drink at least one full canteen.</li> </ol>
Heat exhaustion: Heavy sweating with pale, moist, cool skin; headache, weakness, dizziness, and/or loss of appetite, heat cramps, nausea (with or without vomiting), chills (gooseflesh), rapid breathing, change in mental status, confusion, and tingling of the arms and/or feet. Core temperature is 104°F or less.	<ol style="list-style-type: none"> <li>1. Move individual to a cool shady area or improvise shade; loosen or remove clothing.</li> <li>2. Monitor the individual and give water as tolerated; should slowly drink at least one full canteen.</li> <li>3. Spray or pour water on individual and fan to cause a cooling effect.</li> <li>4. Urgent medical evaluation is indicated, especially if there are mental status changes.</li> <li>5. If you have ice packs, use them. Put them in arms, armpits, and neck.</li> </ol>
Heat Stroke: The individual stops sweating (hot, dry skin). They first may experience headache, dizziness, nausea, fast pulse and respiration, seizures and mental confusion. They may collapse and suddenly become unconscious. Core temperature is greater than 104°F, typically around 108°F(although it may be as low as 102°F). THIS IS A MEDICAL EMERGENCY.	<ol style="list-style-type: none"> <li>1. Heat stroke is a life-threatening medical emergency. Move the individual to a cool shady area or improvise shade; loosen or remove clothing.</li> <li>2. Start cooling the individual immediately. Spray or pour water on individual and fan.</li> <li>3. Elevate legs. If you have ice packs, use them. Put them in arms, armpits, and neck.</li> <li>4. If conscious, individual should slowly drink at least 1 cup (8 oz.) of cool water every 20 minutes. Do not force water if abdominal discomfort occurs.</li> <li>5. Seek medical aid immediately. Continue cooling while awaiting transport, and continue first aid while en route.</li> </ol>

TABLE 1-1.--Heat Injury, Signs/Symptoms, and First Aid.

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## AN EXAMPLE OF SOP ON UNIT PHYSICAL TRAINING AND OPERATIONS IN HOT ENVIRONMENTS

NAME OF USMC UNIT

UNIT PHYSICAL TRAINING AND OPERATIONS IN HOT ENVIRONMENTS

1. Company commanders will have physical fitness programs that develop strength, endurance, agility, and good health necessary to sustain Marines on the battlefield.
2. The goal of all unit physical training (PT) runs is to bring all personnel to a common level of endurance and promote unit cohesiveness.
3. All unit PT runs should have a safety vehicle, a duty driver, adequate amounts of cool, fresh water, and a corpsman with medical bag and communication capabilities (radio/cell phone to contact Emergency Medical Services (EMS) 911). Factors to determine water quantities include size of unit, length/type of training, and duration and heat index.
4. Before any unit PT or other training operations in hot environments is conducted, the heat index should be announced and appropriate countermeasures employed (i.e., obtain water bulls, water carried by individual Marines, proper clothing, proper acclimatization, etc). Leadership must adhere to the Heat Condition Flag Warning System in enclosure (4) when planning physical fitness programs and other operations in hot environments.
5. Marines with a previous heat-related injury or who are taking dietary supplements must inform their senior leadership to ensure close monitoring of the Marine to reduce the potential for additional heat stress injury. Medical records of Marines who have suffered a heat-related illness must be flagged for ease of identification of susceptible Marines and close monitoring by the corpsman.
6. Marines who are unacclimatized to the region, overweight, or unaccustomed to strenuous exercise must be provided a gradual program of PT with slower and shorter runs. The corpsman or medical officer must evaluate Marines with illnesses, especially those with fever or dehydration to determine fitness for PT or other training operations in the environment.

ENCLOSURE (2)

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## THE WET-BULB GLOBE TEMPERATURE (WBGT) INDEX SYSTEM

1. Installation. Use a standard WBGT equipment station as described in paragraph 3. Commands will use instruments that are calibrated and traceable to the National Institute of Standards and Technology or International Standards Organization. Commands may also use direct reading and portable heat stress monitors. The monitors are reliable and avoid the use of alcohol or mercury thermometers. For those units without access to a WBGT equipment station, the WBGT Index shall be obtained from the local weather station and communicated to all units affected.

2. Frequency of Readings. WBGT readings shall be taken before commencement of planned PT and whenever surrounding temperatures are expected to exceed 80 degrees Fahrenheit. Compute the WBGT every hour on the hour from the time normal work commences until training is completed.

a. Take WBGT readings at the local site; Medical Department personnel will train those taking readings. Record the readings in a log maintained at the site and display the appropriate warning flag.

b. Note that some military and civilian weather stations may not routinely report WBGT readings, providing a heat index instead. The heat index is an attempt to quantify the effect, which high levels of heat and humidity have on the human body. Heat index is calculated differently from the WBGT and should not be used for determining heat stress.

3. Equipment. A WBGT equipment station will be used. In addition to the actual equipment used, a thermo-screen shelter should be used to house the dry-bulb thermometer and spare instruments. The WBGT equipment station consists of the following:

a. Dry-Bulb (DB) Thermometer. Standard alcohol in glass thermometer that measures ambient air temperature and is the only instrument kept inside the thermo-screen instrument shelter.

b. Wet-Bulb (WB) Thermometer. This is a standard alcohol in glass thermometer with a moist wick surrounding the bulb. The remainder of the wick is placed in a 125ml flask of distilled water. This temperature measurement takes into account the moisture content of the air.

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c. Globe Thermometer (GT). A copper sphere about 6 inches in diameter, the exterior of which is painted matte black. A  $\frac{1}{4}$ -inch hole in the sphere allows the insertion of an alcohol in glass thermometer. The alcohol in glass thermometer must be 12 inches long and graduated from 30 degrees Fahrenheit ( $^{\circ}$ F) to 150 $^{\circ}$ F.

d. Shelter, Instrument Thermo Screen. This item is listed in section L of the Naval Aviation Supply Table 00-34-QL-22 under Meteorological Equipment for Aerological Units. The stock number is 5410-00-267-8898, ML-41.

#### 4. Setup of the WBGT Equipment Station

a. The GT must be suspended from a 6-foot vertical support with a horizontal arm about 36 inches long. A sturdy-braided flexible wire from the outboard end of the horizontal arm should suspend the globe. The center of the globe should be 48 inches from the ground. The arm must point south to avoid a shadow of the upright from falling on the globe.

(1) To perform reliably, the globe must be situated in an open area unshielded in any way from the sun and wind. The ground below should be either grass or gravel. Asphalt surfaces are not desirable.

(2) The globe requires no attention except that the surface should be kept free of dust and streaks and must be repainted each year. After rain, the thermometer should be removed and the globe turned upside down to remove accumulated moisture.

b. The WB thermometer is an ordinary alcohol thermometer (30 $^{\circ}$ F to 150 $^{\circ}$ F) with a wet wick around the bulb and exposed in an unshaded position to natural air movement and to solar radiation.

(1) The wick consists of a white cotton shoelace with the tips cut off. The shoelace must be cotton, as other fabrics will give false readings. One end surrounds the bulb of the alcohol; the other end is immersed in distilled water contained in a 50ml Erlenmeyer flask.

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(2) The wick must be rinsed with fresh water every 2 days, and the water in the flask replaced with fresh distilled water every 2 days. Every week the wick must be washed with soap and water, and then rinsed thoroughly.

(3) The wick surrounding the bulb must be thoroughly wet, but the bulb must be 1 inch above the mouth of the flask and freely exposed to the air.

#### 5. WBGT Logs

a. WBGT readings shall be maintained in a bound log that contains the following minimum information:

(1) Location of WBGT Station.

(2) Subordinate commands affected by WBGT readings at that station and their phone numbers.

(3) Instructions for flag warning system.

(4) WBGT computation formula.

b. Logs shall contain the following information:

DATE	TIME	DB	GT	WB	WBGT	FLAG	SIGNATURE
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c. Heat Stress Logs will be inspected during regularly scheduled site visits, command inspections, and during Inspector General inspections.

6. Computing the WBGT. The WBGT is computed as follows:

$(DB \times 0.1) + (GT \times 0.2) + (WB \times 0.7) = (WBGT)$  where  
(DB=Dry Bulb; WB=Wet Bulb; GT=Globe Thermometer).

ENCLOSURE (3)

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## HEAT CONDITION FLAG WARNING SYSTEM

1. When the WBGTI reaches the temperatures indicated in the parenthesis below, the corresponding color of flag closest to the specific site of the hot weather operation shall dictate level of the operation.

a. Green Flag (WBGTI of 80°F to 84.9°F). Heavy exercises, for unacclimatized personnel, will be conducted with caution and under constant supervision.

b. Yellow Flag (WBGTI of 85°F to 87.9°F). Strenuous exercises, such as marching at standard cadence, will be curtailed for unacclimatized troops in their first 3 weeks per NAVMED P-5010. Avoid outdoor classes in the sun.

c. Red Flag (WBGTI of 88°F to 89.9°F). All PT will be curtailed for those troops who have not become thoroughly acclimatized by at least 12 weeks per NAVMED P-5010. Those troops who are thoroughly acclimatized may carry on limited activity not to exceed 6 hours per day.

d. Black Flag (WBGTI of 90°F and above). All nonessential physical activity will be halted for all units.

2. Essential Activities. Essential activities are activities associated with scheduled exercises or other major training evolutions where the disruption would cause undue burden on personnel or resources, be excessively expensive, or significantly reduce a unit's combat readiness. Essential outdoor physical activity will be conducted at a level that is commensurate with personnel acclimatization as determined by the unit's commanding officer in coordination with the unit's medical officer or medical personnel. All efforts should be made to schedule major hot weather training activities to occur during cooler periods of the day, such as very early hours in the morning, or later in the evening.

3. Controls. The following controls will be used to reduce heat stress:

a. Conduct heat injury prevention awareness training prior to the operation.

b. Ensure all individuals are acclimatized to the environment prior to the operation.

c. Ensure water consumption is a continuous process (prior to, during, and after the operation).

ENCLOSURE (4)

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d. Do not allow an individual to continue working or performing hot weather operations when they stop sweating. Call medical personnel immediately. They will obtain the individual's core body temperature with a rectal thermometer.

e. Reduce physical demands such as excessive lifting or digging with heavy objects.

f. In heat stress conditions, schedule intermittent rest periods with water breaks. Newly enlisted or transferred military personnel shall receive annual heat stress and awareness training prior to deployment into hot, dry, and humid environments. They shall receive the training locally from medical personnel serving their command. Encourage individuals to drink cold water. Do not rely on electrolyte-replenishment fluids such as sports drinks as a sole source of hydration. If the units provide them, drink them diluted with plentiful cold water. Pre-hydrate by drinking 8 to 16 ounces of water before PT. Avoid drinks containing caffeine due to their diuretic effect.

g. Large volumes of relatively clear urine indicate proper hydration. Small volumes and/or dark urine indicate dehydration and the need to drink more fluids. The aim is to produce relatively clear to light yellow urine. If the individual urinates once daily and/or produces darker urine, they may be severely dehydrated, and may need to start drinking water immediately. Be aware that some foods, vitamins, prescriptions, and over-the-counter drugs may alter urine color or have a diuretic effect.

h. Whenever feasible, wear loose clothing. Loose clothing allows free air circulation to promote cooling effect on the body. Avoid wearing tight fitted clothing. Use sun-blocking lotions with appropriate sun protection factor of 30 or more.

i. Provide protective shelters and recovery areas that reduce solar exposure such as shades, air-conditioned enclosures and rooms, where feasible.

j. Caution. Do not overhydrate. Drinking too much water (overhydrating) may be dangerous. Since the stomach can empty water to the intestines (the site of its absorption) at a maximum rate of approximately 1.2 liters per hour it is of no value to drink more than this amount per hour. Again, use the guideline in enclosure (5).

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## FLUID REPLACEMENT GUIDELINES FOR WARM WEATHER TRAINING

Flag Condition	WBGTI °F	Easy Work		Moderate Work		Strenuous Work	
		Work/ *Rest	Water per Hr.	Work/ *Rest	Water per Hr.	Work/ *Rest	Water per Hr.
Green	80 - 84.9	No Limit	½ Qt.	50/10	¾ Qt.	40/20	1 Qt.
Yellow	85 - 87.9	No Limit	¾ Qt.	40/20	¾ Qt.	30/30	1 Qt.
Red	88 - 89.9	No Limit	¾ Qt.	30/30	¾ Qt.	20/40	1 Qt.
Black	90 & >	50/10	1 Qt.	20/40	1 Qt.	10/50	1 Qt.

\* Rest means minimal physical activity (sitting or standing) and should be accomplished in the shade if possible.

Note 1: For MOPP gear, PPE, or body armor, ADD 10°F to the WBGT Index.

Note 2: Work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Individual water needs will vary ±¼ quart per hour.

TABLE 5-1. Fluid Replacement Guidelines For Warm Weather Training.

Easy Work	Moderate Work	Strenuous Work
-Weapon maintenance -Walking hard surface at 2.5 mph, < 30 lb. load -Manual of Arms -Marksmanship training -Drill and ceremony	-Walking loose sand at 2.5 mph, no load -Walking hard surface at 3.5 mph, < 40 pound load -Calisthenics -Patrolling -Individual movement technique; e.g., low crawl, high crawl -Defensive position construction -Field assaults	-Walking hard surface at 3.5 mph, ≥ 40 lb. load -Walking loose sand at 2.5 mph with load -Running and participating in physical conditioning training

TABLE 5-2.--Examples of Work.