

**BY ORDER OF THE COMMANDER
22D AIR REFUELING WING**

**MCCONNELL AIR FORCE BASE
INSTRUCTION 48-102**



16 SEPTEMBER 2010

Aerospace Medicine

THERMAL STRESS MANAGEMENT

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available for downloading or ordering on the e-Publishing website at www.e-Publishing.af.mil.

RELEASABILITY: There are no releasability restrictions on this publication.

OPR: 22 AMDS/SGPB

Certified by: 22 MDG/CC
(Lt Col. Russell G. Boester)

Pages: 8

This instruction implements AFPD 48-1, *Aerospace Medical Program*, AFPAM 48-151, *Thermal Injury*, and AFMAN 10-100, *Airman's Manual*. It establishes McConnell AFB responsibilities and procedures to prevent adverse effects of heat stress. This instruction establishes policies and rules for all personnel who are assigned to McConnell AFB and perform non-flying (ground) operations and duties during periods of hot weather. It does not apply to contractor personnel. It defines the Wet Bulb Globe Temperature (WBGT) Index, WBGT monitoring and reporting procedures, Heat Stress Index and unusual clothing stipulations. During mission essential, contingency or emergency operations, commanders may waive the provisions of this instruction; however, when commanders waive procedures they must ensure all supervisors exercise caution, make certain all subordinate personnel are aware of heat injury symptoms and take actions to protect the health of their personnel. Ensure that all records created as a result of processes prescribed in this publication are maintained In Accordance With (IAW) Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of IAW with the Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/>. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional's chain of command.

INTRODUCTION

During hot weather 22 AMDS Bioenvironmental Engineering Flight (BEF) (22 AMDS/SGPB) will routinely monitor WBGT and initiate Heat Stress Advisories via Command Post when

necessary. The Command Post will disseminate the information to wing, group, and unit commanders' offices. Commanders and supervisors will ensure personnel comply with work rest cycle and hydration recommendations to prevent heat related injuries.

1. MANDATORY, PREFERRED AND ACCEPTABLE REQUIREMENTS:

1.1. May. Indicates an acceptable or satisfactory method of accomplishment.

1.2. Should. Indicates a preferred method of accomplishment.

1.3. Will. Indicates a mandatory requirement and is also used to express a declaration of intent, probability or determination.

2. RESPONSIBILITIES:

2.1. 22 AMDS Bioenvironmental Engineering Flight (BEF) (22 AMDS/SGPB).

2.1.1. Will manage the Heat Stress Program.

2.1.2. Will monitor Wet Bulb Globe Temperature (WBGT) Index and initiate Heat Stress Advisories IAW Paragraph 3.3. Upon request, during non-routine activities (change of command ceremonies, parades, and chemical warfare exercises) BEF will monitor localized WBGT at the site of non-routine activities. The WBGT Index is synonymous with Heat Stress Index.

2.1.3. Will coordinate with 22 SFS to change out placards at the Entrance Gates.

2.1.4. Will coordinate with Kansas Air National Guard BEF to take WBGT measurements during the first weekend of every month and Reserves during their perspective duty days and/or weekend.

2.1.5. During normal duty hours, all related questions/concerns will be directed to BEF. After duty hours, emergency items will be directed to BEF technician on-call. The BEF Technician on call can be reached at (316) 213-4671.

2.2. 22 ARW Command Post (22 ARW/CP), once informed by BEF, will notify wing, group and tenant unit commanders' offices:

2.2.1. 22 ARW/CC

2.2.2. 184 IW/WCC (Wing Control Center)

2.2.3. 931 ARG/CC

2.2.4. 22 MSG/CC

2.2.5. 22 MDG/CC

2.2.6. 22 OG/CC

2.2.7. 22 MXG/CC

2.3. **Organizational commanders** are responsible for disseminating the Heat Stress Advisory throughout their respective organization.

2.4. **First line supervisors and workers in non-flying activities** are to be notified of conditions. They are to ensure that all their personnel are briefed on the contents of this

directive and take appropriate precautions, (See Paragraphs 3.4. and 5. for guidelines to exposure and precautions, respectively). Document all Heat Stress training in AF Forms 55 and 971.

2.5. **Individuals** must report suspected heat stress disorders to their immediate supervisor and take protective measures to prevent adverse heat effects reference Paragraph 5.

3. PROCEDURES:

3.1. When notified of any of the heat stress conditions listed in [Attachment 2](#), Command Post will immediately disseminate a Heat Stress Advisory to those listed in Paragraph 2.2. Personnel operating outside the heat stress recommended activity restrictions may only do so at the direction of the supervisors.

3.2. **Heat Stress Posting:** Heat Stress Condition posting may be accomplished by hoisting a placard or erecting a stand with the appropriate color or other means to notify personnel to take the necessary actions.

3.2.1. The entrance gates to the base (22 SFS) and main entrance in Dole Center (Health and Wellness Center) will post the appropriate Heat Stress Condition placard in accordance with [Attachment 2](#), upon notification of the Heat Stress Advisory.

3.3. Monitoring and Notification of Heat Stress Index:

3.3.1. BEF will monitor WBGT from 01 June through 30 September unless weather patterns (unusually hot or cold) indicate and adjustment is warranted. When the ambient temperature reaches and remains at or above 85 °F, the Heat Stress Index will be monitored at least hourly by BEF until the Heat Stress Index reaches below 85 °F or 1700 hours, whichever comes first.

3.3.2. Heat Stress Advisories will be disseminated every time the Heat Stress Index changes IAW [Attachment 2](#).

3.3.3. The BEF will notify Command Post when change in Heat Stress Index occurs with the following initial message:

“Heat Stress Advisory. IAW MAFBI 48-102, the current Heat Stress Index for (day, month, and time) is (__. .) degrees F. This is within the _____ zone. This information is updated at least hourly. During duty hours, direct any questions to Bioenvironmental Engineering Flight. After hours, contact Bioenvironmental Engineering Flight technician on-call via phone at 316-213-4671.”

3.4. Guidelines for Occupational Heat Exposures:

3.4.1. Personnel who routinely perform their jobs while exposed to hot environments (such as aircraft maintenance and ground maintenance) are occupationally exposed.

3.4.2. Supervisors of occupationally exposed personnel should use [Attachment 2](#) to plan work and rest cycles for individuals under their control per AFPAM 48-151, *Thermal Injury*.

3.4.3. Heat Stress Index exposures above 90°F should be allowed only when performing mission essential duties and only then with caution.

3.4.4. When necessary to accomplish a task, two or more details should be arranged to work in sequence to ensure each crew receives the proper work and rest cycle.

4. HEAVY, RESTRICTIVE CLOTHING AND PERSONAL PROTECTIVE CLOTHING:

4.1. Wear of overly bulky and restrictive clothing (e.g., chemical warfare defense ground crew ensemble: CWDE) places an added heat stress burden on individuals. If personnel are wearing CWDE or other heavy, restrictive clothing, a correction factor must be added to report Heat Stress (WBGT) Index to account for added physiological stress. See [Attachment 2](#) for guidance.

4.1.1. Personal protective clothing considerations and recommendations will be addressed by BEF during routine Occupational Health Assessment.

5. SUPERVISOR/INDIVIDUAL CONSIDERATIONS:

5.1. Ability to adjust and tolerate heat varies with the individual. Some of these factors are:

5.1.1. Acclimatization (body's ability to adjust to heat).

5.1.2. Duration of exposure.

5.1.3. Amount of work to be performed.

5.1.4. Air movement and humidity.

5.1.5. Type of clothing worn.

5.1.6. Physical fitness.

5.2. **Recognition of Heat Stress Disorders.** When one or more of the following symptoms occur, an evaluation by a physician should be sought.

5.2.1. Impaired mental function.

5.2.2. Weak and/or rapid pulse.

5.2.3. Loss of bowel or bladder control.

5.2.4. Dizziness, faintness or weakness.

5.2.5. Muscular cramping or convulsions.

5.2.6. Nausea or vomiting

6. PREVENTION OF HEAT STRESS ILLNESS OR INJURY

6.1. Acclimatization - This is of utmost importance for new arrivals from cooler climates. This process takes ten to fourteen days and is directly related to the heat stress imposed on the individual. A period of acclimatization is required for all personnel regardless of each individual's physical condition. An individual is considered acclimatized if he or she has undertaken regular exercise for longer than 10 days in the same environmental conditions as the proposed activity.

6.2. Encourage Water Intake. Supervisors are responsible for ensuring water is available. Water must be readily available of a primary work area. Do not use thirst as an index of how much to drink; drink more than you think you might need. Small amounts of water (one pint

every hour) are encouraged during periods of moderate activity when exposed to hot temperatures.

6.3. Obtain adequate rest before physical exertion.

6.4. Avoid strenuous exercise during hottest hours.

6.5. Wear loose clothing to permit the passage of air.

6.6. When possible, schedule heavy work during the cooler early or late hours of the day. More frequent rest periods may be necessary.

7. Prescribed Forms/IMT's: No Forms or IMT's prescribed by this publication.

8. Adopted Forms/IMT's: AF IMT 847, *Recommendation for Change of Publication*

JAMES W. CROWHURST, Colonel, USAF
Commander, 22d Air Refueling Wing

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

Threshold Limit Values (TLVs) For Chemical Substance and Physical Agents and Biological Exposure Indices (BEIs), American Conference of Governmental Industrial Hygienists (ACGIH) (2009)

AFPAM 48-151, *Thermal Injury*, 18 November 2002

AFMAN 10-100, *Airman's Manual*, 1 March 2009

AFPD 48-1, *Aerospace Medical Program*, 3 October 2005

AFPAM 48-151, *Thermal Injury*, 18 November 2002

AFMAN 10-100, *Airman's Manual*, 1 March 2009

AFMAN 33-363, *Management of Records*, 1 March 2008

Abbreviations and Acronyms

AF— Air Force

AFB— Air Force Base

AFMAN— Air Force Manual

AFPD— Air Force Policy Directive

AFPAM— Air Force pamphlet

BEF— Bioenvironmental Engineering Flight

CWDE— Chemical Warfare Defense Ground Crew Ensemble

IMT— Information Management Tool

OPR— Office of Primary Responsibility

RDS— Records Disposition Schedule

WBGT— Wet Bulb Globe Temperature

Terms

Acclimatization.—A period of adjustment an individual's body requires becoming accustomed to working in hot environments. Full acclimatization occurs through progressive degrees of heat exposure and physical exertion. Adaptation typically occurs during the first 10 to 14 days of heat exposure and the largest change occurs at days 3 to 5. An individual is considered acclimatized if he or she has undertaken regular exercise for longer than 10 days in the same environmental conditions as the proposed activity. However, adaptation is lost within a few weeks unless the exposure to heat is repeated regularly at intervals of four days or less. If exposure to the hot environment has followed a substantial period of travel or crossing time zones, the acclimatization time must be assumed to be longer than 10 days.

Heavy (Hard) Work.—Examples include: Walking on hard surface at 3.5 mph with >40 lb load, and walking on loose sand at 2.5 mph with load, armament crew, heavy aircraft repair, and NBC reconnaissance.

Moderate work.—Examples Include: Walking on hard surface at 3.5 mph with <40 lb load, walking on loose sand at 2.5 mph with no load, patrolling, refueling, low crawl, high crawl, defensive position construction, and field assaults.

Light (Easy) Work.—Examples include: Walking on hard surfaces at 2.5 mph with <30 lb load, weapons maintenance, manual of arms, tower operations, pilot ground activities, marksmanship training, and drill and ceremony.

Heat Stress.—Heat stress is the combination of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental heat stress factors are air temperature, radiant heat exchange (example, sunlight), air movement, and relative humidity. Physical work contributes to total heat stress through the body's production of heat (metabolic heat) as it burns energy to sustain the work. This production of metabolic heat depends on the intensity of the physical effort, which is affected, in turn, by body size, muscular developments, physical fitness, and age.

Wet Bulb Globe Temperature (WBGT) Index.—The WBGT Index is a combination of temperature measurements which consider dry air temperature, relative humidity, and radiant heating. The equation for the WBGT Index uses dry bulb (DB) temperatures, natural wet bulb (NWB) temperatures, and globe (GT) temperatures. Heat Stress Index is synonymous with WBGT Index.

Attachment 2

GUIDELINES FOR OCCUPATIONAL HEAT EXPOSURES

Table A2.1. Guideline for Average Acclimatized Airmen Wearing BDU/ABU, Hot Weather

Heat Cat/Flag Color	WBGT (F)	EASY WORK		MODERATE WORK		HARD WORK	
		Work Rest Cycle	Water Intake Qt/hr	Work Rest Cycle	Water Intake Qt/hr	Work Rest Cycle	Water Intake Qt/hr
1	78 - 81.9	No Limit	0.5	No Limit	0.75	40/20 min	0.75
2	82 - 84.9	No Limit	0.5	50/10 min	0.75	30/30 min	1.0
3	85 - 87.9	No Limit	0.75	40/20 min	0.75	30/30 min	1.0
4	88 - 89.9	No Limit	0.75	30/30 min	0.75	20/40 min	1.0
5	> 90	50/10 min	1.0	20/40 min	1.0	10/50	1.0

Table A2.2. Guidelines for Average Unacclimatized Airmen Wearing BDU/ABU, Hot Weather

Heat Cat / Flag Color	WBGT (F)	EASY WORK		MODERATE WORK		HARD WORK	
		Work Rest Cycle	Water Intak Qt/hr ^a	Work ^b Rest ^c Cycle	Water Intake Qt/hr	Work Rest Cycle	Water Intake Qt/hr
1	78 - 81.9	No Limit	0.5	50/10 min	0.75	30/30 min	0.75
2	82 - 84.9	No Limit	0.5	40/20 min	0.75	30/30 min	1.0
3	85 - 87.9	No Limit	0.75	30/30 min	0.75	20/40 min	1.0
4	88 - 89.9	50/10 min	0.75	20/40 min	0.75	10/50 min	1.0
5	> 90	40/20 min	1.0	10/50 min	1.0	Not allowed	Not applicable

A2.1. For all 3 work rates, individual water requirement may vary by +/- 0.25 qt/hr.

A2.2. When performing work/exercise with ground crew ensemble, fire fighting gear or other similar restrictive or impermeable clothing add 10 degrees F to the current Heat Stress Index. Add an additional 5 degrees to the current Heat Stress Index if wearing combat armour.

A2.3. Rest means minimal physical activity, i.e. sitting or standing, accomplished in the shade if possible.

A2.4. Caution: Daily fluid intake should not exceed 12 quarts. Hourly fluid intake should not exceed 1 quart.