Dryden Flight Research Center
Edwards, California 93523

DCP-S-071, REDLINE Revision A-2
Expires May 1, 2012

Dryden Centerwide Procedure

Code S

Heat Stress Measurement, Notification, & Response Procedure

Electronically approved by
Assistant Director for Management Systems

CONTENTS

1.0 PURPOSE OF DOCUMENT

This document describes the procedures for the taking heat measurements, notifying the Dryden population, and responding to heat stress conditions at Dryden Flight Research Center (DFRC).

2.0 PROCEDURE SCOPE & APPLICABILITY

Scope: This procedure applies to heat measurement, notification methods, and responses used to alert DFRC employees and contractors of heat stress conditions.

Applicability: This procedure applies to all residents and visitors at all DFRC facilities during the periods when heat stress conditions exist.

3.0 PROCEDURE OBJECTIVES, TARGETS, METRICS, & TREND ANALYSIS

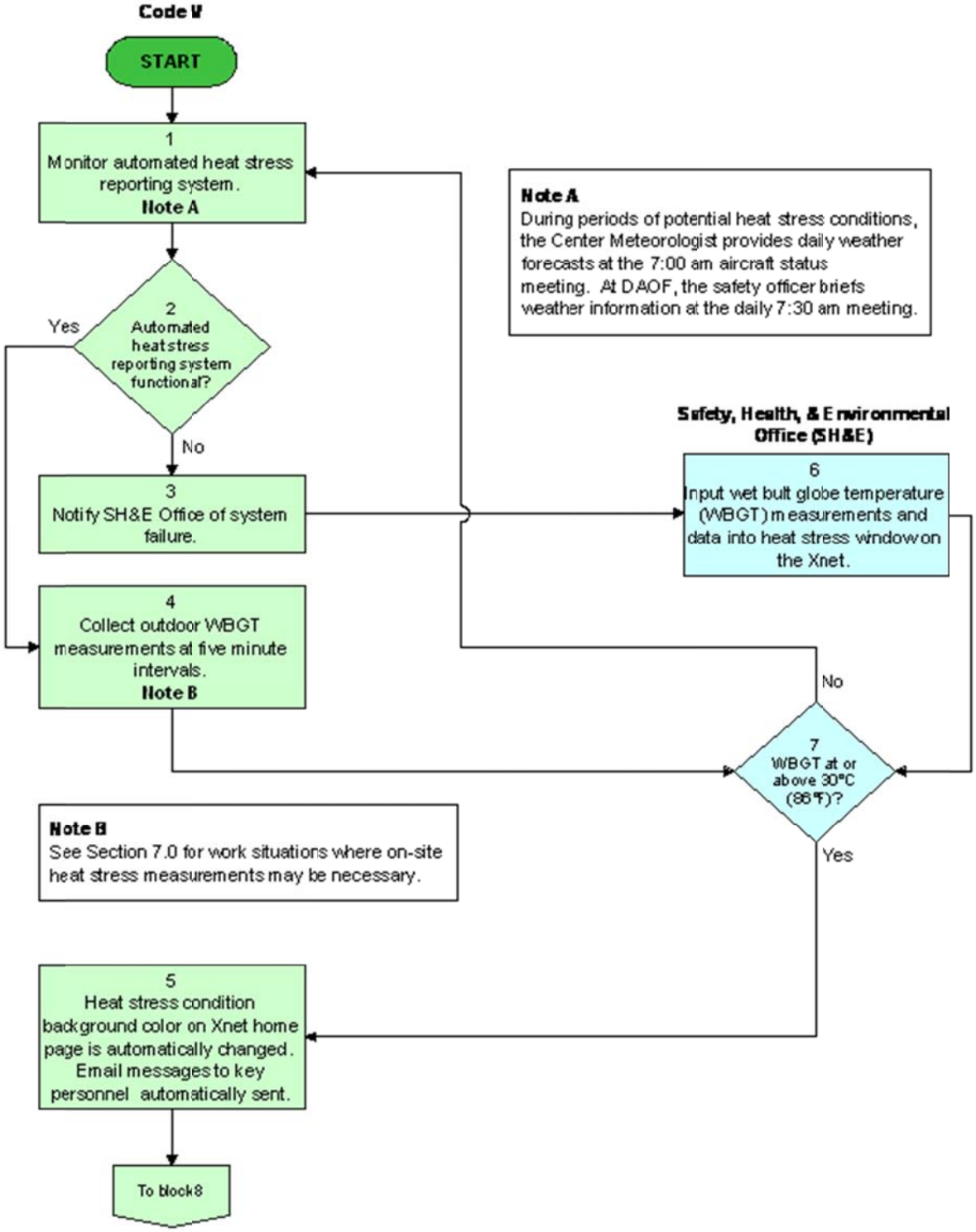
Objective: Ensure that all employees are notified of heat stress conditions
Target: All email and verbal announcements are made within 15 minutes of the hazardous heat stress condition.
Metric: Number of all announcements made within 15 minutes of the hazardous heat stress condition

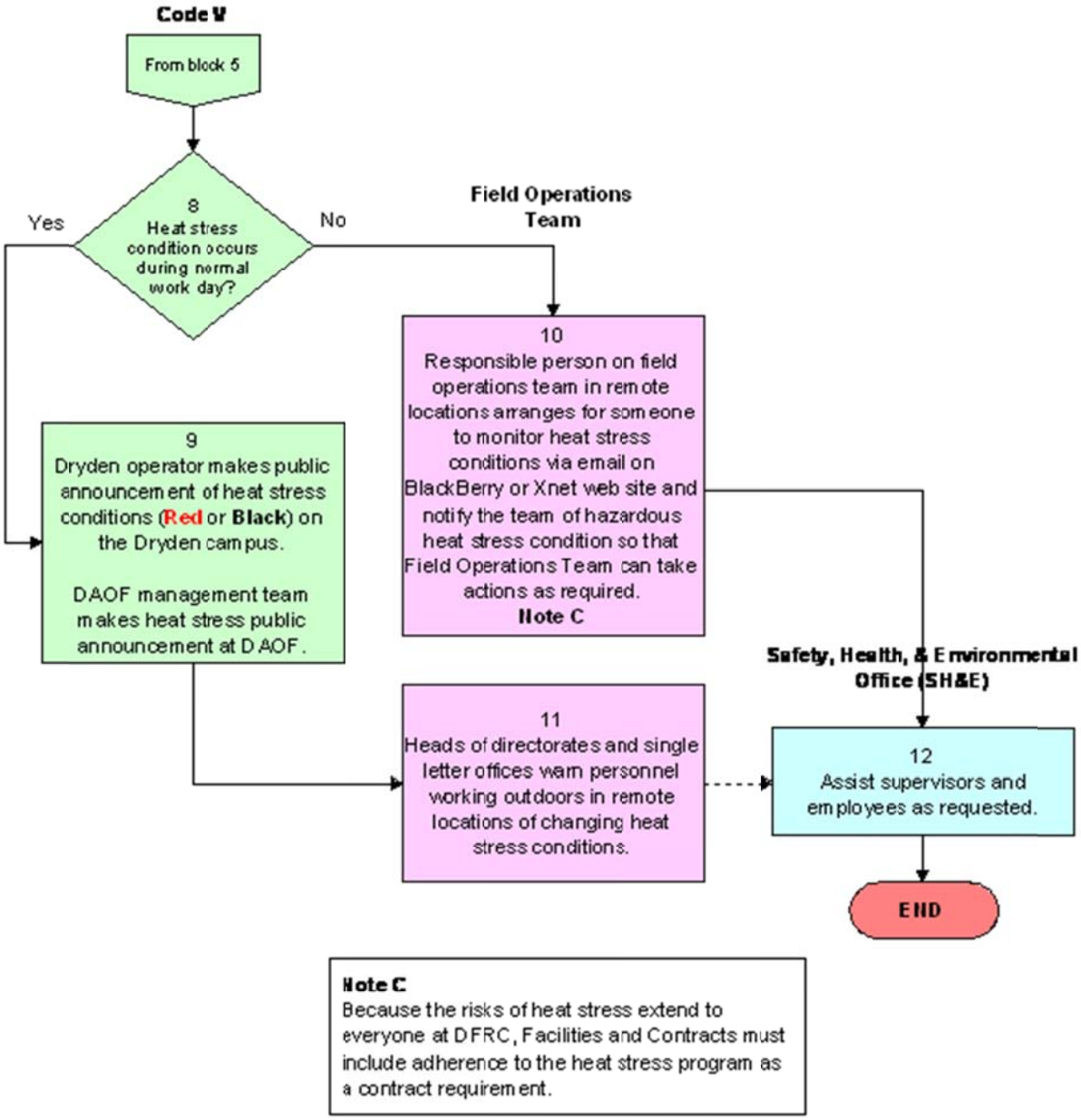
Objective: Ensure that proper protective measures are taken to prevent heat stress.
Target: No heat stress injuries occur.
Metric: Number of heat stress injuries

4.0 WAIVER AUTHORITY

This procedure may not be waived.

5.0 FLOWCHART




Code V
From block 5
8
Heat stress condition occurs during normal work day?
Yes
No
Field Operations Team
10
Responsible person on field operations team in remote locations arranges for someone to monitor heat stress conditions via email on BlackBerry or Xnet web site and notify the team of hazardous heat stress condition so that Field Operations Team can take actions as required.
Note C
9
Dryden operator makes public announcement of heat stress conditions (Red or Black) on the Dryden campus.
DAOF management team makes heat stress public announcement at DAOF.
Safety, Health, & Environmental Office (SH&E)
11
Heads of directorates and single letter offices warn personnel working outdoors in remote locations of changing heat stress conditions.
12
Assist supervisors and employees as requested.
END
Note C
Because the risks of heat stress extend to everyone at DFRC, Facilities and Contracts must include adherence to the heat stress program as a contract requirement.

6.0 RESPONSIBILITIES

This section describes the responsibilities for the operation of the automated heat stress reporting system, other heat stress monitoring, and for making the necessary notifications.

6.1 Directorates and Single Letter Offices

Heads of directorates and single letter offices are responsible for the following actions:

A. During normal duty hours, notify their personnel in a work setting that would be affected by a change in heat stress conditions.

B. Where there is a possibility for personnel to be affected by hazardous heat stress conditions on weekends while working on the lake bed or other remote locations where public announcements cannot be heard, ensure that ~~someone on~~ the work team lead ~~has a Land Mobile Radio (LMR) that can be used to continuously monitor the LMR 911 radio net (Zone 9, Channel 2 or 9) for~~plans work to avoid heat stress conditions or makes arrangements for someone to monitor heat stress announcements and contact the team in the field. ~~If no radio is available in your organization, contact the Safety, Health, & Environmental (SH&E) Office~~.
NOTE: To see the 3-day weather forecast, click "Heat Stress Index" window on the Xnet.

C. Take additional precautions for individuals who may be more susceptible to heat stress (e.g., due to age, fitness, health, or lack of acclimatization).

D. Report to the Center Health Unit the location(s) and names of individuals who unavoidably must work in condition black heat stress levels.

E. Where the specific work environment may create higher than predicted heat stress conditions, contact the staff meteorologist for outdoor ambient measurements and the SH&E Office for measurements indoors or in enclosed spaces.

6.2 Codes A and F

Include adherence to the heat stress program in this document as a contract requirement.

~~**6.3 Code J**~~

~~Make announcements over the PA and radio systems of hazardous heat stress conditions on weekdays and weekends at the main Dryden campus and the Dryden Aircraft Operations Facility (DAOF). Radio announcements will be made on the EMS 911 and DFRC 911 net.~~

~~6.4~~6.3 Code R

A. During periods of potential heat stress conditions, the Center Meteorologist is responsible for providing daily weather forecasts at the 7:00 A.M. aircraft status meeting to make personnel aware of conditions that may warrant preventive actions

B. Where the local outdoor work environment may create higher heat stress conditions, take ambient heat stress measurements (WBGT) at the worksite as requested (e.g., work on dark surfaces such as blacktop, etc.)

~~6.5~~6.4 Code S

A. At the DAOF, the Safety Officer provides information on potential heat stress conditions at the 7:30 A.M. meeting.

B. Code S is responsible for taking heat stress (WBGT) measurements should there be a failure of the automated heat stress information system and in indoor heat stress situations where the outdoor automated ambient measurements do not apply (e.g., unconditioned buildings or other enclosed spaces where heat stress conditions are suspected, or near large heat sources).

~~6.6~~6.5 Code V

A. Code V is responsible for maintaining and monitoring the automated notification system, and monitoring the availability of heat stress source data.

B. Make announcements over the PA of hazardous heat stress conditions on weekdays at the main Dryden campus. ~~and the Dryden Aircraft Operations Facility (DAOF). Radio announcements will be made on the EMS 911 and DFRC 911 net.~~

6.6 DAOF Management Team

Make announcements over the PA of hazardous heat stress conditions on weekdays at the DAOF.

7.0 AUTOMATED HEAT STRESS INFORMATION

The heat stress indication banner on the Xnet homepage is updated every 5 minutes and is considered to be representative of heat stress conditions of most outdoor locations such as the flight line or dry lake bed. When Condition Red or Condition Black thresholds are exceeded, an automated email is distributed to key personnel. Condition status is based on WBGT threshold criteria set forth by the American Conference of Governmental Industrial Hygienists' Threshold Limit Values for Physical Agents.

There are some work situations under which the automated heat stress measurements are not appropriate. These situations include

- Work on dark surfaces such as blacktop or dark roofing materials
- Work in non-air conditioned buildings (e.g., small utility buildings) and other enclosed spaces (e.g., rooftop enclosures) during hot weather
- Work in close proximity to large heat sources (e.g., boilers, steam piping, ovens, and environmental chambers).

7.1 Heat Stress Announcements

When the WBGT index exceeds the Condition Red or Condition Black thresholds, an automated email is distributed to key personnel, and the following announcement is made on the public announcement (PA) system at the Dryden campus ~~Post 1~~ and the DAOF ~~Post 50~~:

"The Dryden Safety Office has issued a Condition Red/Black heat danger warning."

7.2 Dryden Heat Stress Guidelines

(For outdoor or non-air conditioned work areas.)

A. Condition Green – Heat Caution (WBGT index = 82 to 84.9)

1) Discretion is required in planning heavy exercise for nonacclimatized personnel.
2) This is a marginal heat stress limit for all personnel.
3) Suggested water intake: ½ to 1 quart per hour depending on body size and physical work demands.

B. Condition Yellow – Heat Caution
(WBGT Index = 85 to 87.9)

1) Strenuous activity must be curtailed for new and nonacclimatized personnel during the first 3 weeks of heat exposure.
2) Avoid work in direct sunlight, if possible.
3) Frequent rest periods are encouraged. No more than 45 minutes without a 15 minute break if in direct sunlight.
4) Encourage water consumption at least every 30 minutes, 3/4 to 1 quart per hour depending on body size and physical work demands.
5) Supervisors will occasionally observe workers for signs of heat illness and compliance with hydration and rest periods.
6) Consider postponing less important outdoor tasks.
7) Minimum of two persons for field work to monitor each other's condition and to render assistance if necessary.

C. Condition Red – Heat Danger
(WBGT Index = 88 to 89.9)

1) Avoid work in direct sunlight, if possible.
2) Frequent rest periods are encouraged. No more than 15-30 minutes without at least an equal length rest break if in direct sunlight.
3) Encourage water consumption at least every 15 minutes, 3/4 to 1 quart per hour depending on body size and physical work demands.
4) Supervisors will actively survey workers at least hourly for signs of heat illness and ensure compliance with hydration and rest periods.
5) Consider postponing noncritical outdoor tasks.
6) Allow considerably longer times for work completion.
7) Consider rotating workers to indoor jobs periodically for cooling-off periods.
8) Minimum of two persons for field work to monitor each other's condition and to render assistance if necessary.

D. Condition Black – High Heat Danger
(WBGT Index = 90 or above)

Note: Condition black events average less than 10 hours per year with some years having no condition black events.

1) Terminate all outdoor tasks, except when terminating a task would increase risk (e.g., a critical lift or an aircraft recovery operation is in progress). Where termination is not immediately feasible, move quickly to safely terminate the activity while taking the following precautions:
2) Avoid work in direct sunlight, if possible.
3) Take frequent rest periods (no more than 15 minutes work per hour).
4) Suggested water intake: 1 quart per hour.
5) Minimum of two persons for field work to monitor each other's condition and to render assistance if necessary.

7.3 Symptoms and sign of heat illness

1) Painful muscle cramps
2) Excessive fatigue
3) Nausea or vomiting
4) Headache
5) Fainting
6) Dizziness or unsteadiness
7) Confusion or agitation

***** If these symptoms are present, **CALL 911 IMMEDIATELY**. Neurological symptoms such as confusion, slurred speech, staggering, agitation, seizures, or unconsciousness **must** be assumed to be a **medical emergency**.

7.4 Heat Stress Components

The WBGT is used to determine these environmental conditions. Factors affecting the WBGT are:

1) Temperature
2) Amount of direct sunlight
3) Humidity
4) Wind

7.5 Additional Points to Consider

1) The above guidelines apply to a reasonably fit worker performing light to moderate activities in direct sunlight. Heavier work may require more restrictions; lighter work may require less.

2) One to 2 weeks is required to acclimatize to a hot environment. Early in the summer, workers will be at increased risk to heat illness.
3) An acclimatized individual does not require additional salt or electrolytes. Flavored drinks or sports drinks may help to increase consumption, but are not necessary.
4) Caffeinated beverages and alcohol cannot be used to hydrate due to increased loss of fluids by urination.
5) Conditions including poor nutrition; small body size; increasing age over 40; previous heat injuries including sunburn; heart disease, high blood pressure, diabetes, some skin diseases; liver, kidney or respiratory problems; poor physical condition; being female; being pregnant; recent illness; or taking certain medications, can reduce a worker's tolerance to heat stress.
6) Above 37° C (99° F), the ONLY way to lose body heat is by sweating and evaporation. Hydration must be maintained by frequent consumption of water (1-2 quarts per hour can be lost by sweating).
7) Sunscreen and hats are strongly encouraged when working in the sun.
8) Providing rest breaks and access to rest rooms may help encourage water consumption.
9) Anything that can be done to decrease heat load will be helpful (working in hangars or shade, fans to increase airflow and evaporation, erecting shaded areas outdoors for breaks, working at a slower pace, and planning activities for cooler times of the day)

8.0 MANAGEMENT RECORDS & RECORDS RETENTION

Outdoor ambient heat stress monitoring data will be maintained by the NASA Meteorology Group (Code R). Other work place heat stress monitoring in indoor or enclosed locations will be maintained by the SH&E Office. Heat stress monitoring data will be retained for a minimum of 5 years.

Records are preserved, maintained, and disposed of in accordance with NPR 1441.1, NASA Records Retention Schedules, and DFRC records management procedures. Destruction of any records, regardless of format, without an approved schedule is a violation of federal law.

9.0 RELEVANT DOCUMENTS

9.1 Informational Documents

Cal OSHA, Title 8	Section 3395, Heat Illness Prevention
American Conference of Governmental Industrial Hygienists (ACGIH)	TLVs and BEIs (current version), section on Heat Stress and Heat Strain.

10.0 ACRONYMS

DAOF	Dryden Aircraft Operations Facility
LMR	Land Mobile Radio
PA	Public Announcement
WBGT	Wet Bulb Globe Temperature

Chapter 14 History Log
IPRP Review Date: 04-16-10

This page is for informational purposes and does not have to be retained with the document.

Status Change	Document Revision	Effective Date	Description of Change
Baseline		05-28-10	Replaces DCP-S-009, Chapter 14
Redline	Baseline-1	06-04-10	**REDLINE. This document expires in 90 days.** • Rebuilt flowchart to reflect changes in responsibilities • Section 6.0, Responsibilities: o Revised item B o Deleted Code J section o Revised Code V section o Added DAOF Management Team section • Section 7.1: Removed references to Posts 1 and 50
Revision	A	09-02-10	Extended redline expiration date from September 4, 2010 to March 1, 2011.
Admin Change	A-1	05-06-11	Extended expiration date again, from March 1, 2011 to November 1, 2011.
Admin Change	A-2	11-01-11	Extended expiration date from 11-01-11 to 05-01-12.