PHYSIOLOGICAL MONITORING FOR HEAT STRESS

This appendix is intended to be used to ensure workers maintain safe heart rates and body temperatures under conditions of heat stress. Not all individuals are affected by heat in the same way. An individual's response to working in a hot environment depends on a variety of factors (i.e., level of physical fitness, age, gender, level of acclimatization, use of alcohol and drugs, etc.).

Physiological monitoring measures an individual's response to heat, determining their heat load and acts as a method of preventing overexposure. Physiological monitoring is the preferred monitoring technique in heat-related work environments. The monitoring shall be performed by the worker or another qualified individual. This will allow personnel to adjust the work/rest regimen according to their individual tolerance for heat.

WARNING

Any time symptoms of sudden fatigue, nausea, dizziness, or lightheadedness manifest themselves, the individual should discontinue work immediately and report for medical evaluation.

Physiological monitoring may result in a more restrictive or less restrictive work period for individuals with a low tolerance to heat stress. Physiological monitoring may be conducted using one or more of the following methods outlined on Pages 2 and 3 of this Appendix.

Data obtained during Physiological Monitoring (i.e., Heart Rate) will not be retained in Industrial Hygiene Records.

PHYSIOLOGICAL MONITORING FOR HEAT STRESS

Heart Rate Monitoring (FBP OS&H can recommend heart rate monitors)

NOTE
During time in which heart rate is being determined ensure work activities are in a safe configuration

Sustained Heart Rate (3 Minutes) Monitoring (e.g., measured during work with a heart rate monitor such as a wristwatch, chest strap or pulse oximeter)

Determine heart rate during work by using a heart rate monitor. Discontinue any environmentally-induced or activity-induced heat stress for an individual when the heart rate is greater than the value representing 180 beats per minute (bpm) minus the individual's age in years (this is their Maximum Sustained Heart Rate - MSHR). Work may resume when an individual's heart rate is below 180 bpm minus the individual's age in years. *This limit only applies to healthy adults with assessed normal cardiac performance.* Workers having a resting heart rate in excess of 120 bpm shall be referred to the Occupational Physician for evaluation.

If an individual's sustained heart rate is greater than their MSHR then the work activity shall be stopped, the individual shall move to a cooler area, and Contractor Supervision and OS&H shall be consulted for additional actions.

Heart rate monitoring shall be conducted prior to work start (resting heart rate) and after each 15- minute work period unless performed continuously using heart rate monitors that are programmed to notify the worker or qualified individual (e.g. audible or vibrating alarm) when their MSHR is reached. If reliant on an alarm it is important to ensure the type of alarm can be heard or felt by the individual based on the scope of work.

An evaluation of the type of heart rate monitor shall be performed to ensure it is and adequate for the job scope. For example using a wristwatch heart rate monitor unequipped with an alarm set at 180 minus individuals age in years would not be suitable for use under PPE that is taped at the wrists and relying on an audible alarm for alert would not be suitable if working with loud equipment or wearing hearing protection. Common types of HR monitors used at PORTS are listed below;

- Wristwatch– useful if in an area where PPE doesn't obstruct the wrist.
- Chest strap/watch combination – useful if wearing PPE that obstructs the wrist.
- Pulse Oximeters – useful if wearing PPE that obstructs the wrist and chest strap cannot be worn.

In all cases the type of monitor needs to be evaluated to ensure it is practical for the job scope and type of PPE. Contact Contractor OS&H for ANY concerns, questions or recommendations for heart rate monitors.

PHYSIOLOGICAL MONITORING FOR HEAT STRESS

Body Temperature (Work/Rest Period) (FBP OS&H can recommend oral thermometers)

NOTE

Oral temperature readings may not be applicable for some job scopes (i.e. in an area where respiratory protection is required). In these cases other monitoring techniques must be used.

IF measuring body temperature using an oral thermometer, **THEN**, to ensure an accurate temperature reading is taken ensure the following requirements are met:

- Individual has not ingested food or drink for 15 minutes prior to the reading
- Mouth is kept CLOSED during the reading

A. Measure body temperature at any time during the work period or as soon as possible in the rest period. The body temperature shall not be allowed to stay over 99.5ºF (100.4ºF, if medically approved and fully acclimatized).

   i. If temperature exceeds 99.5ºF (100.4ºF), shorten next work cycle by 1/3 and keep rest period the same. This effectively increases the overall rest time.

   ii. If temperature exceeds 99.5ºF (100.4ºF) at the beginning of the next rest period, shorten the next work cycle by 1/3 and keep rest period the same.

   iii. Continue until body temperature is at or below 99.5ºF (100.4ºF) at the beginning of the next rest period.

B. Temperature monitoring should be conducted approximately every 15 minutes when the applicable TLVs or Action Limits of FBP-IH-PRO-00069, Appendices C – E are exceeded or when workers self-determine that monitoring is appropriate.

C. Length of rest periods times are not dictated by this procedure, but need to be long enough to allow body temperatures to return to pre-start levels.