



SARNIA REFINERY

HEAT STRESS CONTROL

Issue Date: December 15, 2014 Revision #: 5

STANDARD

Document Number:

4000-ZSD-SM00HHCA-000857

Next Review Date: September 15, 2019

Document Owner: Manager, EH&S

Document Contact: Occupational Hygienist

SCOPE AND PURPOSE:

This standard defines the controls to reduce the risk of heat stress.

ROLES AND RESPONSIBILITIES:

The **Occupational Hygienist** is accountable to provide support, as necessary to ensure appropriate control of worker exposure to heat stress and conformance to this Standard.

Workers and Supervisors are accountable to evaluate their work tasks for the potential risk of heat stress and implement necessary controls to avoid heat stress.

Workers are accountable to report to the Health Centre any physical or medical conditions that increase their vulnerability to heat stress.

The **Occupational Health Nurse** is accountable to notify Supervisors, as appropriate, of a worker's increased vulnerability to heat related illness.

Security is accountable to monitor and communicate the Humidex as prescribed by this standard.

Contractors are accountable to conduct all heat stress related monitoring for their workers.

GUIDANCE AND STANDARDS:

During the cooling season, the following general controls shall be implemented:

- Drinking water must be provided.
- Only modesty clothing (i.e., light t-shirt and shorts) should be worn under coveralls.
- Workers should be frequently reminded to be aware of the signs and symptoms of heat related illness and watch for them in themselves and their co-workers.
- Signs and symptoms of heat related illness must be reported to the Supervisor.
- Self-limitation should be encouraged as appropriate.

HEAT STRESS CONTROL

Current versions of approved documents are maintained in Livelink. Printed copies are uncontrolled.

Between May 1st and September 30th each year, the Humidex will be monitored daily by Security, who will announce to the site when the current and/or forecasted high Humidex value for Sarnia is ≥ 29 .

Supervisors shall monitor the wet bulb globe temperature (WBGT) when:

- (1) the Humidex is ≥ 29 ;
- (2) Security has made a heat alert announcement to the site; and/or
- (3) the risk of heat stress is otherwise expected.

As a minimum, general WBGT monitoring must be conducted in an area that can be considered representative of most work areas on-site. WBGT monitoring of specific work areas is necessary when the work area is not appropriately represented by the general monitoring location. This may include confined spaces, work near hot equipment and other work areas that may be notably warmer or cooler than the general monitoring location.

Appropriate hourly work/rest schedules shall be determined in accordance with the following table:

Table 1 - Heat Stress Screening Table

WBGT	Maximum Allowable Hourly Work		
	Light Work	Moderate Work	Heavy Work
<27.5°C	Continuous Work	Continuous Work	Continuous Work
27.5-28.9°C	Continuous Work	Continuous Work	75% Work / 25% Rest
29-29.9°C	Continuous Work	75% Work / 25% Rest	50% Work / 50% Rest
30-31.4°C	75% Work / 25% Rest	50% Work / 50% Rest	25% Work / 75% Rest
31.5-32.9°C	50% Work / 50% Rest	25% Work / 75% Rest	*
$\geq 33^\circ\text{C}$	*	*	*

*Develop a job-specific safe work plan.

Note: the work/rest schedules in the Heat Stress Screening Table represent a worker's hourly time-weighted average (TWA) WBGT and are based on the TLV Screening Criteria provided by the American Conference of Governmental Industrial Hygienists (ACGIH), which are recommended by the Ontario Ministry of Labour for compliance purposes (Ontario Ministry of Labour Health and Safety Guideline – Heat Stress, May 2010).

The following clothing adjustment factors must be added to the WBGT when comparing to the Heat Stress Screening Table:

- 0 Woven coveralls + modesty clothing (i.e, light t-shirt and shorts)
- 3 Woven coveralls + pants and long-sleeved shirt
- 3 Woven coveralls + disposable coveralls without hood
- 4 Woven coveralls + disposable coveralls with hood
- 6 Woven coveralls + Alky Class D jacket
- 9 Woven coveralls + Alky Class C jacket and pants
- 9 Woven coveralls + rain jacket and pants
- 10 Woven coveralls + rain jacket with hood and pants
- 10 Woven coveralls + Alky Class C coveralls with hood
- 13 Woven coveralls + disposable coveralls with hood + Alky Class C jacket and pants

When work cannot be conducted within the constraints of the Heat Stress Screening Table, the following site/job-specific controls shall be considered and implemented as appropriate:

- Increase air movement (where air temperature is <35°C)
- Shield radiant heat sources
- Provide shade
- Relocate work to cooler and/or shaded area
- Reschedule work to cooler day/time
- Provide air-cooling
- Provide mechanical assistance
- Increase worker numbers
- Rotate workers and/or alternate job functions
- Provide shaded rest area near work area or climate-controlled rest area, as appropriate
- Use cooling PPE (i.e., cooling vests)

Where, upon implementation of appropriate site/job-specific controls, work must still be conducted outside the constraints of the Heat Stress Screening Table, work may be performed provided a job-specific safe work plan is developed and:

- all parties involved agree that the implemented controls are adequate; and
- the work is closely monitored to evaluate the effectiveness of the implemented controls and to ensure they remain appropriate. Physiological monitoring of workers should be considered.

The Occupational Hygienist (or designate) may be contacted to assist in the development of a site/job-specific heat stress control plan for work that cannot be conducted within the constraints of the Heat Stress Screening Table and cannot be rescheduled.

TRAINING:

All workers and Supervisors must be trained on the signs and symptoms of heat stress and the measures and procedures required to control exposure.

Supervisors must be trained on the use of the WBGT monitor.

DEFINITIONS:

Heat Stress Heat stress is the net heat load to which a worker may be exposed from that combined contributions of metabolic cost of work, environmental factors and clothing requirements.

Humidex Humidex is a computed value that combines temperature and humidity into one value that is used to describe how hot or humid weather feels to the average person. The Humidex is usually higher than both the WBGT and normal temperature.

Wet Bulb Globe Temperature (WBGT) Wet Bulb Globe Temperature (WBGT) is a widely recognized first-order index of the environmental contribution to heat stress that is influenced by air temperature, radiant heat, air movement and humidity. The WBGT may be higher or lower than normal temperature and is usually lower than Humidex.

Rest Sitting.

Light Work Sitting with light manual hand/arm work, driving, standing with some light arm work and occasional walking.

Moderate Work Sustained moderate hand/arm work, moderate arm/leg/trunk work, light pushing/pulling, normal walking.

Heavy Work Intense arm and trunk work, carrying, shoveling, manual sawing, pushing/pulling heavy loads, walking at a fast pace.

REFERENCES TO RELATED DOCUMENTS:

- [QUESTemp 32 Thermal Environment Monitor Operation Procedure](#)
- [Humidex Monitoring and Communication Procedure](#)

END OF STANDARD

HEAT STRESS CONTROL

Current versions of approved documents are maintained in Livelink. Printed copies are uncontrolled.



REVISION LOG

Date MM/DD/YYYY	Revision	Section	Comment
07/18/2011	1	Roles and Responsibilities	Added entire section.
		Risk Assessment	Replaced with "Guidance and Standards".
		Risk Control	
		Guidance and Standards	Removed requirement for Security to monitor and communicate the WBGT. Added requirement for Security to monitor and communicate Humidex. Added requirement for Supervisors to monitor the WBGT. Revised work/rest schedules table to include all ACGIH TLVs including a WBGT at which all non-essential work must be stopped. Added description of general and site/job-specific controls. Added clothing adjustment factors.
		Training	Added requirement for Supervisors to be trained on the use of the WBGT monitor.
		Definitions	Revised definitions of Humidex and WBGT to include comparisons to each other and normal temperature Removed definition for ACGIH.
		Appendix A	Added Supervisor Decision Logic flowchart.
		Appendix B	Added WBGT Monitoring Log.
		070/22/2011	2
06/27/2012	3	All	Updated format, but did not alter content.
07/24/2013	-	Header	Document Owner & Contact Updated. NO content change. (L. Lebert)
07/28/2014	4	Guidance and Standards	Added the following clothing adjustment factors: <ul style="list-style-type: none"> - 6 for Alky Class D jacket; and - 10 for Alky Class C coveralls with hood.

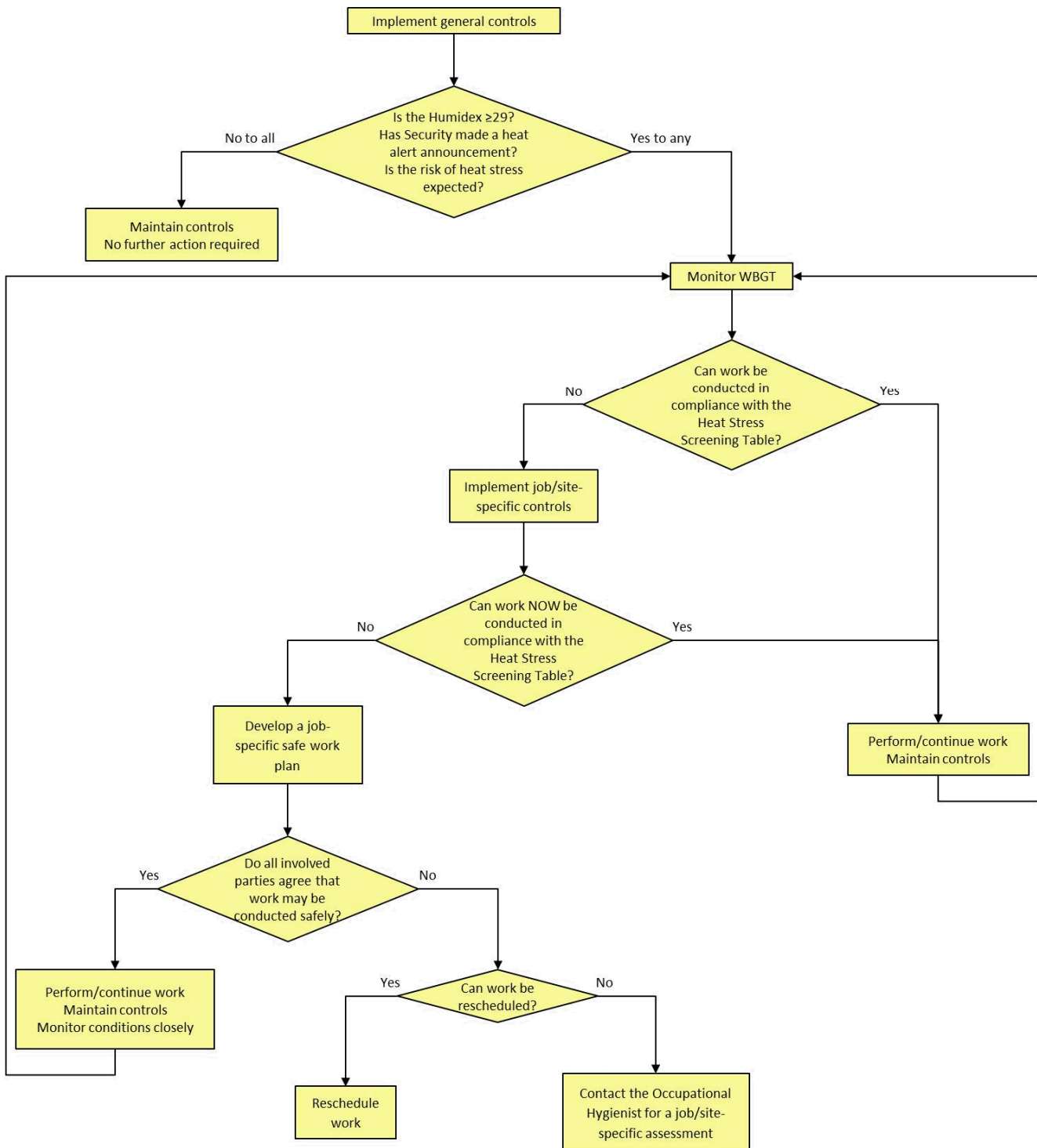
HEAT STRESS CONTROL

Current versions of approved documents are maintained in Livelink. Printed copies are uncontrolled.

12/15/2014	5	Roles and Responsibilities	Added statement to clarify that contractors are required to conduct monitoring for their own workers
		Guidance and Standards	<p>Revised information regarding communication of Humidex from Security to reflect their current procedure.</p> <p>Added detail regarding expectations for WBGT monitoring of both general and specific work areas.</p> <p>Changed wording associated with Table 1 from “Stop all non-essential work” to “Develop a job-specific safe work plan” to more accurately reflect intent of standard.</p> <p>Revised wording to provide clarification regarding work that is conducted outside the constraints of the Heat Stress Screening Table.</p> <p>Added consideration of physiological monitoring of workers.</p>
		Appendix A	The flowchart was revised to better reflect the procedure and to clarify the requirements for work activity outside the constraints of the heat stress screening table.

HEAT STRESS CONTROL

Current versions of approved documents are maintained in Livelink. Printed copies are uncontrolled.





**APPENDIX B
WBGT Monitoring Log**

Document Number:
4000-ZSD-SM00HHCA-000857

QUESTemp 32 ID: _____

DATE	TIME	SAMPLE LOCATION	WBGT + CAF* = CORR. WBGT			WORK ACTIVITY	WORK CLASS.			ACTION TAKEN	INITIALS
			(°C)		(°C)		Light	Moderate	Heavy		
							Light				
							Moderate				
							Heavy				
							Light				
							Moderate				
							Heavy				
							Light				
							Moderate				
							Heavy				
							Light				
							Moderate				
							Heavy				
							Light				
							Moderate				
							Heavy				

*CAF = Clothing Adjustment Factor



The following individuals have approved and signed this document.

UserName: Peter Lynch (plynch)

Title: Mgr EH&S Sarnia

Date: Monday, 22 December 2014, 12:18 PM Mountain Time

Meaning:

=====