Contract : **PROJECT 401 – INTEGRATED TRAINING CENTER FOR QAF JOINT SPECIAL FORCES**

Contract No. : **T-101-01**

Client : **QATAR ARMED FORCES**

Contractor : **GAP INSAAT YATIRIM VE DIS TICARET A.S.**

	Name & Signature	Position	Date
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Revision History:

Rev.	Date	Change Description
0A	February 17, 2021	Issued for Approval
0B	February 25, 2021	Revised, issued for approval

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1. Internal Control

1.1.Employee Responsibilities

All employees of TTE company are required to observe and abide with this procedure.

1.2.Approval

This procedure and any amendments made thereto, require the following approvals.

Approved By:
Construction Manager Lisin S.

Checked By:
HSE Manager Daminov M.

Drafted By:
HSE Engineer Muzgin A.

2. Purpose

Qatar's summer climate is very hot and humid with summer temperatures ranging from 33°C to 50°C with relative humidity up to 100%. This climate creates a potentially dangerous situation for those exposed to the heat. Jobs involving operations in hot environment, where high air temperatures, radiant heat sources, high humidity, or strenuous physical activities have a high potential to induce heat related illness and injuries to employees engaged in such operations.

The aim of this guideline is to protect the health of the TT employee from heat related illness and injuries resulting from exposure to heat. This is based on the normal risk-based approach.

- The hazard must be identified (Recognition).
- It must be measured (Evaluation).
- The hazard must be reduced or mitigated (Control).

The supervisor/foreman is critical in controlling heat stress among the employees who are potentially exposed to conditions that can promote heat related illness. The supervisor can implement controls when heat stress conditions are identified which will protect the employees, if properly assigned and carried out.
The TT employees must be trained to recognize the heat stress signs, symptoms and environmental conditions to be ready to protect themselves and those around them. These guidelines identify fundamental practices and methods of identification of factors that could lead to heat stress and the associated illnesses and provides work practices and other controls that can mitigate or reduce the hazards.
As per Qatar summer schedule, all works executed under the direct sunlight or in open workplaces must be stopped between 11.30 am and 3.00 pm.

3. Scope

This Heat Stress Prevention guideline addresses heat stress identification, evaluation and controls to be implemented to reduce effects of heat related illness & injuries such as heat stroke, heat exhaustion, heat cramp, heat rashes, heat fatigue and dehydration among the employees. This guideline is applicable to all personnel in TTE that require individuals to work in a hot climate while working on the project.

4. Procedure

4.1. Abbreviations & Definitions

HSE – Health Safety & Environment Department
PPE – Personal Protective Equipment
HI – Heat Index
RH – Relative Humidity

Acclimatization - This is a gradual physiological adjustment process that the body makes to improve an individual's ability to tolerate heat. Acclimatization usually takes several days with gradual build up to expected heat loads, workloads and duration of the job.

Buddy system - Pairing of co-employees or team members for the purpose of health protection and looking out for one another.

Heat Index - An index that combines air temperature and relative humidity in an attempt to determine the human-perceived equivalent temperature

Heat Related Illness - Any of the following terms: Heat Stress, Heat Exhaustion, Heat Stroke, brought on by excessive exposure to heat without adequate water, shelter and proper acclimatization.

Dry Bulb Temperature or Air Temperature (DB) - The dry bulb or air thermometer measures the ambient air temperature. This measurement is used in the heat index calculation. A series of white plates surround the sensor to shield it from radiant heat.

Area in charge - The Area in Charge is a person authorized by Manager who will be responsible for keeping his area and staff safe. Their responsibility includes Management of people, Processes, Materials, Equipment, Infrastructure and Environment.

Relative Humidity (RH) - Relative humidity is the ratio of the quantity of water vapour present in the air to the quantity that would saturate it at any specific temperature.

4.2.Heat Stress & Heat Index

Heat stress occurs when heat is absorbed from the environment faster than the body can get rid of it. The resulting strain on the body comes from the combined contributions of the job (e.g. work activity), environmental factors (e.g. air temperature, humidity, air movement, radiant heat), and employee factors (e.g. extent of acclimatization and hydration).

The "Heat Index" has been selected to define general overall heat stress conditions for the workforce. The heat index, also known as "effective temperature", is useful as a first order indicator of the effect of humidity on how hot a particular exposure feels to an individual. It includes no evaluation of the effect of either convective or radiative heat exchange, and does not consider the rates of heat gained by physical activity. The heat index does not take into account air velocity which is a major factor in removing heat and water vapor by convection from the skin and clothing surfaces. The heat index combines relative humidity and air temperature. It is predictive of heat stress in circumstances in which the relationship has been established for a particular environment.

The heat index indicates thermal comfort. When the relative humidity is elevated the evaporative process is restricted which reduces the cooling effect of perspiration. The heat index does not take into account the radiant heat load which is primarily attributed by working in direct sunlight. It also does not take into account the nature of the work (heavy manual work or light work) nor the clothing worn by the employee.

The heat index can be obtained by directly measuring the dry bulb temperature and relative humidity and reading the corresponding heat index from the heat stress table. Refer to Heat Index Chart (Attachment 1).

When the heat index reaches levels that have been known to produce heat illness, additional work practices to reduce the heat stress should be implemented to reduce the effects of the radiant heat load, physical activity, and insulative effect of the clothing and personal protective equipment. Refer to the work practices in the "Control" section.

Instrumentation to determine the heat index must be utilized to measure the air temperature in full shade conditions and measure or calculate the relative humidity. The heat index will be determined using properly calibrated instruments and in accordance with manufacturer's recommendations.

4.2.1. Heat Disorders & Health Effects

- **Heat Fatigue** - A factor that predisposes an individual to heat fatigue is lack of acclimatization. The signs and symptoms of heat fatigue include impaired performance of skilled mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

- **Heat Rashes** - The most common problem in hot work environment, prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by un-evaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to cool environment.

- **Heat Cramps** - These are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating and lack of water replenishment. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

- **Heat Collapse** - In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the employee should gradually become acclimatized to the hot environment.

- **Heat Exhaustion** - Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the sufferer may be operating machinery or controlling an operation that should not be left unattended; moreover, the sufferer may be injured when he faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.
  Signs and symptoms: headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

- **Heat Stroke** - Heat stroke is a form of hyperthermia, an abnormally elevated body temperature with accompanying physical and neurological symptoms. This occurs when the body's system of temperature regulation fails and body temperature rises to critical levels.
  Primary signs and symptoms of heat stroke: confusion; irrational behaviour; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature (106°F).

4.2.2. Factors contributing to Heat Stress

Heat stress is normally brought about by a range or combination of factors involving the interaction of the Activity/task, environment and the employee.

- ***Activity/Task Factors***
- Frequency of exposure
- Duration of exposure
- Physicality of work
- Inadequate rest periods
- ***Environmental Factors***
- High air temperatures
- Low air movement
- High relative humidity
- Radiant heat from hot objects such as furnace
- ***Employee Factors***
- Incomplete acclimatization
- Dehydration
- Excessive or inappropriate clothing
- Medical Condition
- Individual Susceptibility (age, overweight, poor physical condition)

4.3. Heat Stress Control

Controls can be applied to the work situation which could be defined as work practices, personal, administrative, or engineering. Apply them to fit the nature of the task depending on the specific situation.

4.3.1. Engineering Controls

- Feasible engineering controls will be sought and implemented, where practicable to do so, to reduce the heat load on an individual. This may include the following:

- ***Shade and Shielding***
- Shade is one of the most important heat stress controls for this climate. Radiant heat load can be reduced as much as 10°C degrees when working in shade vs the direct sunlight. (Wind screens provide some measure of shade yet allow significant radiant heat through and reduce ventilation.)

- For non-routine work areas without insulation on hot sources temporary-insulating blankets

should be used to shield the sources while work is being done in the area.

- As a minimum guideline, the shaded area must have green net on all the sides including the top to prevent direct sunlight with seating arrangements to rest. Cool drinking water is to be provided with glasses/flasks to drink. Necessary drainage arrangements are to be made to drain the excess water. Using hands as a means to drink water is to be avoided. Food may only be consumed in the designated dining facilities.
- ***Area Cooling***

- Shaded break areas should be kept cooler than the work areas to facilitate quicker recovery from the effects of heat. It is recommended that a 10–15 degree difference in temperatures be maintained between work area and break area. This will avoid excessive cooling which is not recommended except for heat emergencies. Where cooling of a break area is not feasible, air circulation with fans should be used to help with cooling through sweat evaporation.

- ***Ventilation***
- Increasing airflow through a work area, such as fans and air conditioning, will help increase the evaporation rate and cooling of the people. This will not be effective if the temperature of the air blowing across the employees is over 40°C since it may then actually result in increased heat stress.
- Confined spaces should be evaluated for proper ventilation. If needed, cool air should be pulled in near the employees.

- ***Mechanical Aid***

- Where practical, mechanical assistance should be used to reduce the physical requirements of the job and thus reduce the metabolic rate. For example use appropriate lifting equipment/ transportation to move material rather than making several trips using heavy loads.

4.3.2. Administrative Controls & Work Practices

- **Acclimatization**

- The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The employee will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.

- ***Work Scheduling***

- Scheduling extremely hot jobs for the cooler part of the day, at night or for a cooler day if possible.
- Where possible, postpone the hot job until equipment can be taken out of service and allowed to cool down.
- Schedule additional time for hot jobs to allow for additional cooling breaks especially if cooling measures are not used.

- ***Work Rest Intervals***

- On hot days or for hot jobs, more frequent breaks should be planned especially if heavy work is involved.
- Rest breaks should be taken in a cool location and cool fluids consumed. Avoid hot beverages and those that contain caffeine such as tea, coffee and sodas.

- ***Self Evaluation***

- Each person while working in hot conditions (high temperatures) must be aware of the signs and symptoms of heat stress related illnesses and early warning indications, so they can recognize them in themselves or their colleagues. Typical symptoms include weak and fatigue, painful muscle cramps, headache and dizzy, nauseated, heavy sweating.
- The supervisor should be notified of any early indications and corrective action taken.
- Heart rate (rapid pulse) is one of good indicators of the degree of heat stress that a person is experiencing.
- Most individuals can be trained to monitor their own heart rate. On jobs where heat stress is a concern periodically pause work and immediately take a pulse for 15 seconds. Multiply this by 4 to get the heart rate.
- Healthy acclimatized employees should avoid prolonged work or environmental combinations that cause their heart rate to exceed the recommended maximum heart rate, maximum heart rate when taken during the first minute of rest. The heart rate should drop to 110 — 120 beats per minute following the first minute of rest. Maximum heart rates should be below the following levels.

Age	Max. Rate
20	162
30	157
40	152
50	147
60	141

- Urine color to be checked by individual to identify the level of dehydration as per the Attachment 3 Urine Chart

  Since each person is different and medical conditions can affect reaction to heat stress, it is important to remember that these are only average indicators. The individual's maximum recommended rate could be lower. employees must remain alert to other signs of excessive heat stress.

- ***Employee Rotation***

- Physical activities exposed to hot environment must follow the frequent rotation as per the attachment 2 (Guide on Work Practices to Minimize the Effect of Heat Exposure). employees in additional clothing or suits (e.g. Aluminum Jacket) must be rotated more frequently. If in chemical protective suits or proximity suits, additional cooling devices must be used or

employees must be rotated per the attachment 2 (Guide on Work Practices to Minimize the Effect of Heat Exposure).

- The split job tasks or rotation between employees will relieve a lot stress besides giving them an opportunity to take rest pauses.

- ***Fluid Replacement***

- One of the most important means of reducing the risk of heat stress is drinking plenty of fluids (cold water). When doing hard work in hot areas dehydration may occur due to heavy sweating before a person even feels thirsty. It is recommended that at least 250 ml of fluids be consumed every 20 minutes to prevent dehydration and reduce the risk of illness. Refer to Guide on Work Practices to Minimize the Effect of Heat Exposure (attachment 2).
- Cool water should be readily available during warm weather or in hot work areas.
- Salt supplements are not recommended and must be taken upon advice of a doctor. A well balanced diet should replace all necessary salts and electrolytes.

- ***Buddy System***

- When working in hot environment, consideration should be given to working in pairs with each person watching out for early warning signs of heat stress in the other person.
- In high temperature confined spaces, the person on watch should be alert to the warning signs of heat stress and should ensure that any conditions of entry such as frequent rest breaks and job rotation are followed.

- ***Monitoring***

The below parameters must be monitored to identify the level of Heat Stress.

a. Temperature
b. Humidity
c. Heat Index
d. Wind Speed

- Period of monitoring shall be performed during the summer season.

- ***Flagging System***

- Use of colour coded flagging system in accordance with the Heat Stress Index is strongly recommended at all open work place area to ensure that the Heat Stress Management system is consistently applied throughout the outdoor work sites.

- ***Communication***

- If the Heat Index reached to the 39 (Amber) or above the information shall be communicated via mail / sms to employees.

- ***Training***

- Employees must be trained to recognize symptoms of heat stress prior to performing work in potentially heat stress environment.

- Training must include recognition of signs and symptoms of heat stress in themselves and co-employees, work rest schedule, emphasis on fluid intake.
- Training should be conducted closer to the summer months to ensure awareness among employees. This can take place at "toolbox" talks and or JSA discussion sessions at the beginning of each shift.
- Display heat stress awareness posters/ charts.

4.3.3. Personal Protective Equipment

- Three variables associated with clothing alter thermal balance: insulation, permeability and ventilation. Cotton clothing provides most of these variables. Clothes should be made of thin cotton (eases evaporation) loose fitting, light in weight and color (reflects heat). Clothes should be regularly washed to remove the sweat and salt which can irritate the skin and lead to infection. Long sleeved shirts and trousers are recommended. A hardhat should be worn to protect the head, face and neck. Tinted safety glasses can reduce damage to the eyes.
- Cooling devices (e.g. ice vests, water circulating cool suits, air circulating, and reflective clothing) may need to be worn for very specific tasks. However, because they represent a potential safety hazard a work assessment should be performed prior to their employment.

4.4. Roles & Responsibilities

- **Area In charge**

All Area In charge are required to ensure that these guidelines are taken up on their respective Heat Stress Management System and that it is followed without exception for employees and contractors. All Heat Stress or Heat Stress related incidents must be reported to HSE Department immediately.

- Review heat stress precautions in respect of work to be performed in hot locations.
- Consider scheduling the hottest jobs for the cooler part of the day or nights, or the use of other methods to reduce heat stress.
- Scheduling, plan for additional breaks, as needed, to cool off on hot jobs in particular hot conditions.
- Evaluate non-routine jobs where there may be a heat stress concern.
- Stop work as and when required in terms at Heat Index indicator.

- ***Employees***

- Be familiar with the early warning signs of heat stress in themselves and co-employees and take immediate action when they are noted.
- Utilize personal protective equipment as needed.
- Drink plenty of fluids prior to entering a hot environment and continuously when indicated to prevent dehydration.
- Take regular rest brakes.
- Inform the supervisor of any heat stress concerns relating to the work place.

- ***Supervisors***

- Implement heat stress controls in accordance with the heat index.
- Monitor subordinates exposure to heat and modify work schedules accordingly.
- Apply effective controls to control the heat at work.
- Schedule the most physical activities, if possible for the coolest part of the day.
- Provide cool water and encourage employees to drink fluids regularly. As the intensity of work activity and heat index climbs, increase more fluids.
- Adopt the buddy system which encourages fellow employees to look out for each other.
- Ensure employees are aware of the symptoms of Heat stress. Employee training should also be focused on protective measures for working in high heat and humidity in work place areas.

4.5. Implementation and Auditing

- Implementation of the guideline is the responsibility of all the departments.
- Auditing of this guideline will be conducted by the HSE Department. Audit frequency to be performed monthly during the summer season.

4.6. Breach of this procedure

- Any breach of this procedure will be treated as a life saving rule violation and will be dealt with through the TTE disciplinary procedure.

4.7. Attachments

Attachment l. Heat Stress Index

Heat Stress Index combines the temperature and humidity into one number to reflect the perceived temperature. Because it takes into account the two most important factors that affect summer comfort, it can be a better measure of how stifling the air feels than either temperature or humidity alone.
Wet Bulb Globe Temperature (WBGT) is a composite temperature used to estimate the effect of temperature, humidity, wind speed and radiation on humans.

GENERAL HEAT STRESS INDEX

DANGER CATEGORY	HEAT INDEX	WBGT	HEAT SYNDROME	RESTING TIME	WATER NEED
EXTREME DANGER	>54	>32,2	Heatstroke or Sunstroke imminent	Stop All Works	
DANGER	39-53	31,1-32,1	Sunstroke. Heat Cramps or Heat Exhaustion likely. Heatstroke possible with prolonged exposure and physical activity	**Stop Hot Works and Works at Height**	
				15 minutes/ hour	1 glass*/10 minutes
EXTREME CAUTION	32-38	29,4-31	Sunstroke. Heat Cramps or Heat Exhaustion possible. Heatstroke possible with prolonged exposure and physical activity	**Stop Heavy Work**	
				10 minutes/ hour	1 glass*/15 minutes
CAUTION	27-31	27,7-29,3	Fatigue possible with prolonged exposure and physical activity.	**No Work Restriction**	
				5 minutes/ hour	1 glass*/20 minutes
SAFE	<27	<27,7	Safe condition	**All Activity**	

Important: *1 glass = 250 ml. Do not drink more than 1,5 liters per hour (maximum absorption rate of human body)
Note: Degree of Heat Stress may vary with age, health and body characteristics. During Ramadan workers who are fasting should get light duty work.

HEAT STRESS CHART										
	RELATIVE HUMIDITY (Rh)									
Air temperature (^{O}C)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
50	54	>54	>54	>54	>54	>54	>54	>54	>54	>54
49	47	54	>54	>54	>54	>54	>54	>54	>54	>54
48	45	53	>54	>54	>54	>54	>54	>54	>54	>54
47	44	51	>54	>54	>54	>54	>54	>54	>54	>54
46	43	49	>54	>54	>54	>54	>54	>54	>54	>54
45	42	47	54	>54	>54	>54	>54	>54	>54	>54
44	41	46	52	>54	>54	>54	>54	>54	>54	>54
43	40	44	49	>54	>54	>54	>54	>54	>54	>54
42	39	42	47	54	>54	>54	>54	>54	>54	>54
41	38	41	45	51	>54	>54	>54	>54	>54	>54
40	37	39	43	48	54	>54	>54	>54	>54	>54
39	36	38	41	46	52	>54	>54	>54	>54	>54
38	35	37	39	43	49	54	>54	>54	>54	>54
37	34	35	38	41	46	51	>54	>54	>54	>54
36	33	34	36	39	43	48	54	54	>54	>54
35	32	33	35	37	41	45	50	54	>54	>54
34	31	32	33	35	38	42	47	52	>54	>54
33	31	31	32	34	36	40	43	48	54	>54
32	30	30	31	32	34	37	40	44	49	54
31	29	29	30	31	33	35	38	41	45	49
30	28	28	29	30	31	33	35	38	41	44
29	27	27	28	29	30	31	33	35	37	40
28	27	27	27	28	28	29	31	32	34	36
27	26	26	26	27	27	28	29	30	31	32
26	25	25	26	26	27	27	27	28	28	30

Attachment 2. Guideline on Work Practices to Minimize the Effect of Heat Exposure

PREVENTIVE HEAT STRESS WORK ACTIVITIES TO MINIMIZE THE EFFECT OF HEAT EXPOSURE			
Heat Index	**Work:Rest Period (minutes)**	**Water Requirements (1 cup = ¼ litre)**	**Control**
27-31	50:10	Minimum 1 cup every 20 min	Continuous visual monitoring of employees in direct sun and heavy works
32-38	40:10	Minimum 1 cup every 20 min	Not allowed to work alone. Take breaks as needed
39-49	30:10	Minimum 1 cup every 15 min	Work under shade. Take frequent breaks. Possibly reschedule heavy work tasks
50-53	20:10	Minimum 1 cup every 10 min	Stop elevated and confined space work activities
>54	-	-	Stop all works activities

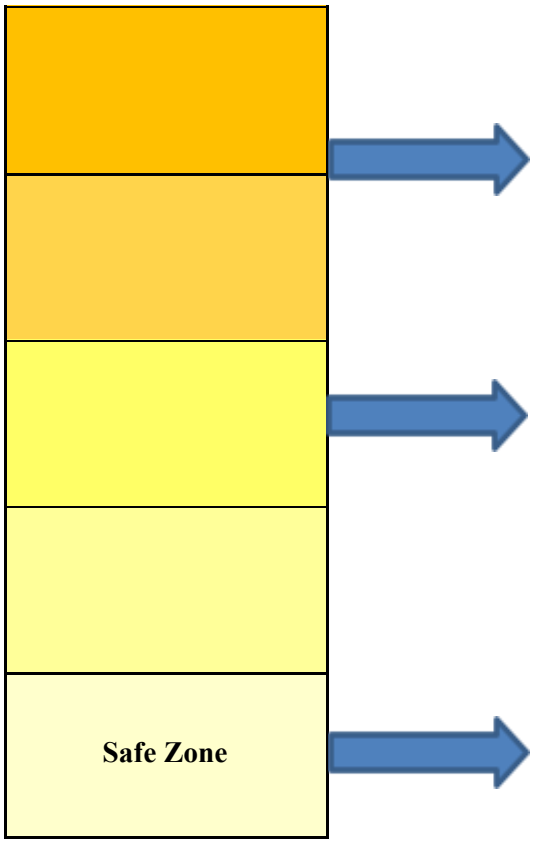
Note:

1. Degree of Heat Stress may vary depending on age, health and body characteristics.
2. Do not take any form of "Salt Supplement" unless advised by a doctor.
3. “Emergency Work” - When the index reaches >54, it is required to consult with HSE Department to determine what mitigation will be applied to minimize the risk of heat stress.

Attachment 3. Urine chart

THE COLOR OF URINE SHOWS YOU HOW DEHYDRATED YOU ARE

Mildly Dehydration
Drink More Water



Not Dehydrated

Extremely Dehydration
Drink Water Immediately

ARE YOU DEHYDRATED?
KEEP ON DRINKING WATER

Attachment 4. Heat Stress Symptoms and First Aid

Condition	Symptoms	First Aid
Heat Rash	- Red, itchy skin	- Keep skin clean and dry - Avoid scratching
Heat Fatigue	- Lack of coordination - Decreased mental ability (thinking, memory, concentration) - Tiredness / fatigue	- Remove individual from heat source - Move to cool / shaded area
Heat Collapse	- Temporary loss of consciousness	- Remove individual from heat source - Move to a cool / shaded area
Heat Cramps	- Painful muscle spasms in arms, legs and abdomen - Profuse sweating	- Move to cool location - Give water to drink - Massage cramping muscles
Heat Exhaustion	- Headache - Nausea - Vertigo/dizziness - Weakness - Thirst - Cold, clammy, skin with excess sweat	- Move to cool location - Open clothing - Give water to drink if conscious - sufferer must lie flat except when drinking
Heat Stroke (Medical Emergency)	- Erratic Behavior - Skin is hot, dry, flushed, not sweating - Weakness, Unsteady Gait - Body Temperature elevated - Convulsions - Loss of Consciousness - Can lead to death if untreated	- Remove excess clothing from the sufferer - Douse sufferer with cool water until medical help arrives - Place a covered ice bag on sufferers head if available

Attachment 5. Heat Stress Infographic

Infographic as per example below will be placed at the entrance to the work zone and in the rest areas.