



Deepwater Horizon MC252

**New Orleans, LA
(NOLA)
Unified Area
Command (UAC)**

Heat Stress Management Plan

**Version: 1.2
Date: August 04, 2010**

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1.0 Introduction

1.1 Purpose

This plan is designed to reduce the risk of heat-related disorders for all employees working onshore, near-shore and offshore response operations related to the MC252 oil spill. Preventative measures are intended to prevent an increase of internal body temperature 1°C (approximately 2°F), above resting temperatures.

Heat stress management will be accomplished through training, supervisory oversight and provision of liquids, and the application of effective and appropriate engineering controls, work practices, and personal protective equipment.

1.2 Acronyms and Definitions

AOR – Area of Responsibility. A response geographic sector within the incident command.

UAC - Unified Area Command. The overarching response command.

HSM – Heat Stress Manager, who has oversight within an Incident Command

HSA – Heat Stress Advisor, who has on-site oversight and power to implement the requirements of this program. On vessels the captain may serve as HSA. The captain may also delegate the HSA duties to a crew member who has been adequately trained on heat stress. The captain is still accountable for the heat stress program on his vessel and ensuring the crew follows the guidelines in this plan. For small vessels of opportunity a HSA may be assigned to cover a group of vessels operating within easy communication of each other.

HSN – Heat Stress Nurse, a registered nurse with special training in heat stress control and treatment.

EMT – Emergency Medical Technician, a person specifically to provide a level of medical response under the supervision of a physician.

PPE – Personal Protective Equipment, a level of control worn by workers for protection against safety and health hazards.

Heat Stress – The net heat load on the body from the ambient environment, clothing, PPE requirements and metabolic demands of work.

2.0 Heat Stress Management Plan

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2.1 Rest Areas

Shaded recovery rest areas with water and electrolyte replacement drinks must be located within 100 yards of the work activity at all times. There must be enough shade available to accommodate the number of workers planned to be on their rest cycle at any one time. Work-rest cycles give the body an opportunity to get rid of excess heat by slowing down the production of internal body heat and providing greater blood flow to the skin for cooling. Shade canopies are a critical component to the Heat Stress Plan. Canopies provide shade to personnel and relief from direct solar radiation. These canopies should be set up before the work-shift. If necessary these canopies need to be moved throughout the day. The HSA may need to rotate workers to ensure that there is adequate space under the canopy. The following equipment must be part of the canopy environment:

- Colored flags or other method to indicate work/rest schedule (if used at the site)
- Establish communications system (Loud speaker/whistle, horn, etc.) to remind workers to drink water at regular intervals and to announce the beginning of a rest period
- Sun Block SPF 50 or greater
- Ice chest with bottled water low sugar sport drinks (ratio = 3 water:1 sport drink) – NOT ENERGY DRINKS!
- Extra ice
- High carbohydrate snacks
- First Aid Kits (including talcum powder to apply to feet)
- Effective communication devices to contact the Safety Representative and EMT Services
- Folding/stackable chairs, table, and cot
- Trash Bags/Containers
- Sandbags/Stakes to Secure Tent(s)

Vessels operating offshore must have sufficient covered areas, either on deck or inside the vessel structure, available to shelter all aboard from direct sun exposure. The captain is responsible for ensuring that there is adequate supply of water and electrolytes. The captain will determine the activity of work that will be completed that day and will bring sufficient water per crew member. A suggested guideline to ensure adequate volume of fluids are taken each day is at least eight quarts per person per day. Extra long days or heavy work loads may require more than this.

Onshore supervisors will review work locations for pre-existing shade areas. Teams will set up shade structures at the beginning of the shift and relocate them as workers move.

Where possible, dining areas should be air-conditioned.

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2.2 Cooling Station

Cooling Stations are a critical resource in managing heat stress. There should be at least one cooling station per site. Depending on site conditions and transportation available, there may need to be more than one cooling station per site.

There is no conclusive information available on the ideal temperature for a rest area cooling station. However, a cooling station with a temperature near 76 F appears to be adequate and may even feel chilly to a hot, sweaty worker. A worker who is showing signs of **excessive** heat stress (see Section 5.0) should be immediately transported to a cooling station. An EMT or HSN must be available to monitor occupants. The EMT or HSN will evaluate the employee and determine the appropriate course of treatment. The EMT and/or HSN must then immediately contact the relevant Area Safety Representative.

Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles provide the greatest benefit to the worker.

2.3 Personal Protective Equipment

Personal protection is specified by the PPE matrix applicable to the worksite. The required PPE is based on the type of work. Protective garments must be selected with heat stress factors in mind. See Section 2.8 Worker Protection below.

2.4 Work/Rest Cycle

The work/rest cycle is one of several protective controls to decrease overall heat stress. *It is not mandatory* if other controls such as air-conditioned rest areas or ice vests are in use and are sufficient to keep worker's body temperatures within 2°F (1°C) of normal for the individual. Work/Rest cycles assume the resting place available to workers is shaded, but otherwise at the *same ambient temperature as the work area*. If the rest area is air-conditioned, then longer work periods and shorter cooling rest periods may be scheduled. *During the rest period workers should remove protective clothing not required in the rest area to enhance their opportunity to cool.*

For this program, the work schedule is based on 20-minute intervals. The HSA or vessel captain is responsible for monitoring performance. Table 1 provides guidance on work/rest cycles. Regardless of the prescribed schedule, if an employee shows signs or feels symptoms of a heat disorder, they should be moved immediately to a shaded or air-conditioned area and encouraged to drink electrolyte replacement fluids or water.

Table 1. Work/rest cycles based on clothing ensemble & threshold air temperature¹.

Clothing Ensemble	Continuous work	40 min work, 20 min rest	20 min work, 40 min rest
Work clothes with or without boots and gloves	< 87 °F	< 93 °F	< 98 °F

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Work clothes with a particle or water barrier coverall ²	---	< 78 °F	< 92 °F
Work clothes with a vapor barrier coverall ³	---	< 75 °F	< 88 °F

Note 1. Temperatures are ambient air temperatures measured with a thermometer, not heat index or wet bulb globe temperature numbers. This is for simplicity and assumes typical high relative humidity.

Note 2 Particle barriers include fabrics made of Tyvek® 1422A, SMS material or the like. Water barriers have a microporous membrane (sometimes called breathable fabrics).

Note 3: Vapor barriers have a monolithic film designed to reduce or stop movement of vapors through the fabric. Examples include DuPont Pro-Shield® 1 or similar and Tychem® QC or similar.

The HSA or supervisor will notify supervisors and workers at the beginning and end of each interval. Alternatively, supervisors or vessel captains will be responsible for managing the work/rest cycle with the HSA to identify the appropriate cycle. Means of communication will be developed at each site with consideration for the use of an air horn, flag system, or other effective means to communicate the appropriate work/rest cycle.

Sometimes work above the temperature or time limits shown in Table 1 cannot be avoided. In such cases, the work may continue, but workers will need further protective controls such as air-conditioned rest areas or cooling vests. With such extra protection the ratio of work to rest time can be increased, but HSAs should monitor workers carefully, and co-workers should monitor each other for signs of heat stress. Shifting operations from day to night can be an effective means of reducing heat stress, where possible.

2.5 Acclimatization

Acclimatization is a gradual physiological adaptation that improves the individual's ability to tolerate heat stress, with an improved sweating response. As the person becomes acclimated, their body responds to heat stress with a smaller increase in body temperature and heart rate than before acclimatization.

Workers new to work in a hot environment, workers returning after 3 weeks of cooler weather, or returning after being sick should recognize that it takes several days to acclimatize. For work that falls into either the 40/20 or 20/40 schedule, the work time per hour should be reduced to 50% of the usual schedule for days 1 and 2 then raised to 75% for days 3 and 4, and finally reach the usual schedule only on day 5.

Supervisors and HSAs should monitor new and returning workers more closely during their acclimatization period. If workers have personal health problems they may require closer monitoring of their signs for heat disorders.

2.6 Training and Capability

Task force members receive heat stress training as part of their overall intake training. The heat stress training is re-enforced with job site briefings from the HSA, health and safety personnel, medical personnel, vessel captains, and job supervisors.

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Training content includes:

- Hazards of heat stress
- Signs / symptoms and first aid for heat-related disorders
- Heat stress hygiene practices
 - Importance of fluid replacement
 - Importance of self-limitation based on symptoms
 - Personal risk factors (e.g., healthy lifestyle, health status, age, obesity, drug-use, alcohol)
 - Role of acclimatization
- Measures in place to manage heat stress exposures such as work/rest cycles
- Responsibilities of workers, supervisors, vessel captains, and HSAs.
- Use of protective clothing and equipment

In addition, OSHA safety fact cards and signs/symptoms/actions card will be distributed.

In addition to the above information and prior to their work assignment, individuals performing onshore clean-up will be verbally instructed in the recognition of:

- Preventative measures (use of sun block, fluid replacement, appropriate clothing, etc.)
- Hazards of heat stress
- Signs and symptoms
- Factors that may put them at risk (e.g. age, obesity, drug-use, alcohol)
- Use of the buddy system when working
- Use of protective clothing and equipment
- First-aid procedures

2.7 Fluid Replacement and Meals

The water needed to replace body fluids varies among individuals, but supervisors should plan for at least eight quarts per person per shift. For heavy work supervisors should plan for up to twelve quarts per person. Water is preferred but electrolyte replacement drinks are often helpful. When providing sports drinks, low sugar options such as Gatorade® G2 are desirable.

Workers should be encouraged to drink water prior to work, and avoid drinks with caffeine, alcohol, or high sugar content, and all carbonated drinks. Single sodas may be served with meals, but workers should not take extra sodas out of the dining area for use during work.

Lighter foods are recommended during the workday. Heat-exposed workers should eat smaller meals at more frequent eating intervals. Provision of hot food at meals is acceptable.

2.8 Worker Protection

PPE Recommendations are as follows:

- Sunscreen with SPF 50 should be applied to face, ears, neck, lips and any exposed skin. It should be reapplied at least every two hours.

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- Hat: broad-brimmed hats (preferable) or baseball caps (acceptable).
- Clothing should be light-colored and loose fitting. (Denim jeans are a poor choice as they are heavy and tightly woven.)
- Use proper PPE for the task. Refer to the most current PPE Matrix – Contact the Site Safety Lead for the most current version. Conditions during the day can change requiring different PPE. The supervisor is responsible for making those adjustments. The amount of PPE worn must be managed carefully. Never use more PPE than required. Some types of PPE impede the body’s ability to cool, which can lead to heat-related illnesses.
- Cooling vests using water ice packs frozen to about 25°F should be specified when heat conditions may exceed the limits of the work/rest cycle above. Cooling vests should be worn under coveralls, but over one layer of underclothing. Vests should be chosen that provide cooling for approximately 80% of the front and back of the torso.
- Powered blowers, such as used for powered air purifying respirators, can be arranged to provide forced air ventilation under protective coveralls, thereby increasing evaporative cooling.

3.0 Heat-Related Disorders

There are several heat-related disorders of which heatstroke is a medical emergency. It is important to be able to recognize the symptoms of all heat related disorders. Information on the signs and symptoms and immediate treatment for each heat-related disorder is provided in Section 5.

4.0 Roles and Responsibilities

4.1 Heat Stress Manager (HSM)

The Heat Stress Manager oversees the overall heat stress management program for the Area of Operations and reports to the ICC Safety Officer on duty. The HSM supports the implementation of the heat stress management plan and the activities of the HSAs. The HSM participates in the review and updates to the heat stress management program and communicates these changes to the HSAs.

4.2 Heat Stress Advisor (HSA)

The Heat Stress Advisor advises site health and safety personnel and task force supervisors and workers on the requirements of the heat stress management program. Specific responsibilities on site include:

- Assist in the location of recovery areas as per Section 2.1
- Inform the site task force on work/rest schedules as per Section 2.3.
- Ensure sufficient water and low sugar electrolyte replacement (such as Gatorade G2) are available as per Section 2.6.
- Monitor the task force for signs and symptoms of heat stress as per Section 5
- Advise supervision as necessary on acclimatization of workers according to Section 2.4

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- Provide worker training as per Section 2.5

4.3 Heat Stress Nurse (HSN)

The Heat Stress Nurse, when assigned to a site, observes and evaluates workers for heat stress, provides training to individuals and work groups, and recommends adjustments to control procedures to the HSA.

4.4 Industrial Hygiene Advisors

Industrial hygiene advisors visiting work sites will assess workplace worker heat stress conditions and controls implementation. They will provide feedback to the HSM, HSA, site safety advisors and supervisors. Their work may include

- Identifying work situations where heat stress should be evaluated and controlled.
- Evaluating heat stress conditions.
- Evaluating personal heat stress of individual workers using monitors that can be worn by workers on the job.
- Observing and evaluating controls such as cooling areas, hydration facilities, work practices, and PPE.
- Reviewing and approving PPE before purchase by procurement staff.
- Providing information on work conditions to medical staff when necessary.
- Recommending improvement of worker protection efforts when indicated.

4.5 Site Medical Advisors, Heat Stress Nurses, and Emergency Medical Technicians (EMTs)

Site Medical Advisors, Heat Stress Nurses, and EMTs are responsible for observing the health status of workers at their sites and treating or referring workers when necessary, and includes:

- Observe workers on the job, in rest areas, and dining areas for signs of heat stress.
- Identify workers at risk due to poor health, and counsel accordingly.
- Reinforce in personal contacts the measures to be taken for protection from heat stress.
- Respond to cases of heat stress when presented and report to site safety.
- Provide feedback and recommendations to supervisors, vessel captains, HSAs, industrial hygienists and the HSM regarding the effectiveness of the heat stress management program in protecting workers at their site.

4.6 Site Safety Lead

The Site Safety Lead is responsible for assisting the HSA at the site. They must ensure that the supervisors and employees are adequately trained in recognizing heat stress. The Safety Lead should provide a daily safety message on heat related illnesses that have occurred on site as well as the preventative measures that will be taken going forward at the site, based on the learning from the investigations of heat-related incidents. Report all incidents to site manager.

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4.7 Supervisor

The supervisor is responsible for ensuring that personnel are assigned a “buddy” on a daily basis. Monitor the buddy system throughout the day to ensure that it is being strictly adhered to throughout the day.

4.8 Task Force Members

Task Force Members (i.e., workers, employees, contractors) have an obligation to protect themselves and others. Specific to the heat stress management program, they are required to

- Drink water and electrolyte replacement drinks before, during and after work.
- Be alert for heat disorders in themselves and others.
- Report heat stress signs/symptoms immediately.
- Follow the instructions provided by the HSA and HSN.
- Inform HSA of potential work limitations.
- Active participation in buddy system.

5.0 First Aid and Medical Plan

Heat-related disorder signs and symptoms and first aid information are provided here. Report heat stress related illnesses in accordance with the standard incident reporting protocols. The Medical Plan (IAP Form 206) provides phone numbers and addresses for local emergency services and hospitals.

All heat-related illnesses must be reported verbally to the Area of Responsibility Heat Stress Nurses within 2-hours of the person reporting the incident. All incidents require a formal written incident report to be submitted to the AOR-ICP and collated at the end of each work shift before submission to Area Unified Command.

5.1 Medical Clearance

When a heat related incident occurs that requires either an IV by a medic or hospitalization that individual must be medically cleared prior to returning to work.

5.1 Heat Stress Disorders: Signs and Symptoms and First Aid Measures

Heat Stroke

Heat stroke is the most serious heat-related disorder and requires immediate first aid if it is suspected. It occurs when the body loses control of its temperature and it increases.

When heat stroke occurs, the body temperature can rise above 104 °F within 10 to 15 minutes. Heat stroke can cause death or permanent injury if emergency treatment is not given.

Signs and Symptoms	First Aid
Signs and symptoms of heat stroke center around its effects on the brain. They include <ul style="list-style-type: none">▪ Throbbing headache/dizziness	Take the following steps to treat a worker with heat stroke: <ul style="list-style-type: none">▪ Cool them immediately and aggressively:

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<ul style="list-style-type: none"> ▪ Slurred speech ▪ Chills and/or shivering ▪ Erratic or unexpected behavior ▪ Confusion ▪ Unconsciousness ▪ Convulsions 	<p>Use ice water immersion, soaking them with cold water, placing ice packs around neck, arm pits and groin.</p> <ul style="list-style-type: none"> ▪ Call 911, notify their supervisor and make arrangements for transportation to medical facility identified in the Medical Plan (IAP Form 206).
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Heat Exhaustion

Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating as well as excessive loss of water due to illness and alcohol consumption.

Signs and Symptoms	First Aid
<p>Signs and symptoms of heat exhaustion include:</p> <ul style="list-style-type: none"> ▪ Noticeable weakness or fatigue ▪ Dizziness ▪ Nausea ▪ Clammy, moist skin ▪ Pale or flushed complexion ▪ Fast and shallow breathing 	<p>Treat a worker suffering from heat exhaustion with the following:</p> <ul style="list-style-type: none"> ▪ Rest in a cool, shaded or air-conditioned area. ▪ Drink electrolyte drinks or water. ▪ If it persists, consider a cool shower, or similar means to cool the skin.

Heat Syncope

Heat syncope is a fainting or near fainting episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration.

Signs and Symptoms	First Aid
<p>Signs and symptoms of heat syncope include:</p> <ul style="list-style-type: none"> ▪ Sudden light-headedness ▪ Sudden dizziness ▪ Grey-out or black-out ▪ Fainting 	<p>Workers with heat syncope should:</p> <ul style="list-style-type: none"> ▪ Sit or lie down in a cool place when they begin to feel symptoms. ▪ Slowly drink water or electrolyte drink. <p>If they have fainted, then Call 911, notify their supervisor and make arrangements for evaluation by EMS or medical personnel to eliminate other causes.</p>

Heat Cramps

Heat cramps usually affect workers who sweat during strenuous activity and have fatigued muscles.

Signs and Symptoms	First Aid
<p>Signs and symptoms of muscle cramps:</p> <ul style="list-style-type: none"> ▪ Muscle pain or spasms usually in the abdomen, arms, or legs 	<p>Workers with heat cramps should:</p> <ul style="list-style-type: none"> • Stop all activity, and sit in a cool place. • Drink water or a sports beverage. • Do not return to strenuous work for a few hours after the cramps subside to assure recovery • Seek medical attention if any of the following apply: <ul style="list-style-type: none"> ○ The worker has heart problems. ○ The worker is on a low-sodium diet. ○ The cramps do not subside within one

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	hour.
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Heat Rash

Heat rash is a skin irritation caused by excessive sweating during humid weather or with prolonged use of chemical protective clothing.

Signs and Symptoms	First Aid
Signs and symptoms of heat rash include: <ul style="list-style-type: none"> ▪ Red cluster of pimples or small blisters. ▪ More likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases. 	Workers experiencing heat rash should: <ul style="list-style-type: none"> ▪ Keep the affected areas clean and dry. ▪ Periodically allow the skin to dry. ▪ Dusting powder may be used to increase comfort.

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