SAMPLE HEALTH AND SAFETY PLAN (HASP)

Source: OSHA.

8.0 HEAT STRESS PREVENTION PROGRAM

(in compliance with 29 CFR 1910.120(h))

(Use Option 1 if employees are NOT exposed to high temperature or relative humidity, AND DO NOT USE PPE that could cause heat stress. If Option 1 applies to you, delete the remainder of this chapter.)

(Option 1)

Employees on this site are not exposed to environmental and work conditions such as temperature, humidity, and use of PPE that could cause either illnesses or injuries related to heat stress.

(Use Option 2 if employees are exposed to high temperature or relative humidity or use PPE that could cause heat stress.)

(Option 2)

This chapter of the HASP describes how the site-specific environmental conditions (temperature, humidity, air movement), employee work loads, and PPE may expose employees to hazards resulting in injury or illness related to heat stress. This Heat Stress Prevention Program outlines exposure controls to protect employees working in hot environments. The elements of this program are outlined in this section and include the following:

- Program Implementation Criteria
- Heat Stress Management
- Training

- References (Optional)

(insert interval) is responsible for implementing the Heat Stress Prevention Program, monitoring work area heat conditions and worker physiological parameters, and for ensuring that employees are trained to recognize the signs and symptoms of heat stress illnesses or injury and what to do if these occur.

8.1 Program Implementation Criteria

The Heat Stress Prevention Program is implemented when work area temperatures rise above XX°F/ XX°C

[Help Text-Many heat stress prevention strategies exist. To assist you, OSHA describes three below.

1. OSHA Technical Manual, Section 3, Chapter 4:

*OSHA has incorporated much of the American Conference of Governmental Industrial Hygienists ACGIH) Heat Stress strategy into the Technical Manual. This strategy recommends a wet bulb globe temperature (WBGT) of 68.5° F as an acceptable environment for unacclimatized employees to conduct continuous moderate work wearing water barrier **permeable** clothing. This value may be used as the criteria for instituting a heat stress protection program. The WBGT is calculated as follows:*

$$WBGT_{(indoor/outdoor\ no\ solar\ load)} = 0.7NWB + 0.3\ GT$$

$$WBGT_{(outdoor\ solar\ load)} = 0.7NWB + 0.2GT + 0.1DB$$

Acronyms in the equations refer to the following:

NWB- Natural Wet Bulb Temperature

GT -Globe Temperature

DB-Dry Bulb

2. The U.S. EPA's "A Guide to Heat Stress in Agriculture"

The U.S. EPA presents a strategy using temperature, relative humidity, and work load to calculate an adjusted temperature. This strategy specifies an adjusted temperature of 75°F as appropriate for an acclimatized employee, under the age of 40, wearing Tyvek®/respirator to conduct a moderate work following a "normal schedule". This value may be used as the criteria for instituting a heat stress protection program. The adjusted temperature is calculated as follows: Ta=DB + WC ± RH

Acronyms in the equation refer to the following:

DB-Dry Bulb

WC-Weather conditions: Add 13°F if the work is being performed in full sun, add 7°F if the work is being performed in partial sun to overcast conditions, make no adjustment if the work is done in the shade or at night.

RH-Relative humidity: use the following scale to adjust humidity

10% subtract 8°F

20% subtract 4°F

30% no change

40% add 3°F

50% add 6°F

60% add 9°F

3. The multi-agency "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" (4-Agency Manual, 1985)

The Manual recommends the use of the current ACGIH guidelines for workers wearing permeable clothing (e.g., standard work clothing), but provides additional guidance for employees wearing impermeable clothing. According to this document, employees wearing impermeable clothing should be monitored when the work area temperature exceeds 70°F. This document also provides a chart identifying the frequency with which employees should be monitored. Work periods are governed by the frequency of monitoring]

8.2 Heat Stress Management

Work practices and exposure controls are used to reduce the risk of elevating an employee's core body temperature. These work practices and exposure controls include the following:

(Add, delete, or edit the work practices and accompanying subsections below as you'd like them to appear in your HASP)

- defining and adjusting employee work/rest intervals
- monitoring for physiological signs of heat stress
- providing cool liquids
- establishing and implementing acclimatization schedules
- using warm weather cooling garments

Employee Work/Rest Intervals

Work/rest intervals are based on PPE, employee work loads, environmental conditions (temperature, humidity, air movement), and the results of physiological monitoring. Work/rest intervals are determined by _____ and communicated to employees by (insert method) . Work/rest intervals are adjusted throughout the work shift as needed and communicated to each employee at the conclusion of an applicable rest period, prior to reentry into the work zone. Guidelines for work/rest schedules for this site are provided in Table 8-2b.

Table 8-2b: Guidelines for Work/Rest Schedule Determination (Heat Stress)			
Work Area Air or Adjusted Temperature Range	PPE Level	Work Period (minutes)	Rest Period (minutes)

[Help Text-Adjusted temperature ranges and work/rest durations should be consistent with the heat stress prevention strategy chosen in Section 8.1. Both the ACGIH and the U.S.EPA identify recommended work/rest durations for the adjusted temperature ranges.]

Monitoring

Physiological monitoring is conducted to alert employees and their supervisors to potential heat stress illness. Initial monitoring is conducted and documented at the beginning of the work shift, prior to entry into the work zone, by _____(insert name of responsible person).

Additional physiological monitoring is performed at the beginning and end of each rest cycle. Reentry and readjustment of the work/rest cycle are determined based on the guidelines listed in Table 8-2c.

Table 8-2c Physiological Monitoring			
Type of monitoring	Monitoring location	Action levels - vital signs	Work/Rest Modification

[Help Text: Both the OSHA's Technical Manual and the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" provide guidance on work/rest interval reassessment based on rest cycle monitoring data. Guidelines in both documents are essentially the same. Neither the ACGIH (1999) nor the U.S. EPA reference provides physiological monitoring guidance.

Personal monitoring may include measuring the heart rate, recovery heart rate, oral or ear canal temperature, or percent water loss.

Heart Rate Measurement: Count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Recovery Heart Rate Measurement: Compare the pulse rate taken at 30 seconds (P_1) with the pulse rate taken at 2.5 minutes (P_3) after the rest break starts. The two pulse rates can be interpreted using Table III:4-4.

Employee Body Temperature Measurement: Check oral or ear canal temperature as early as possible in the rest period, before the employee drinks. If the employee's body temperature exceeds 99.7oF, shorten the next work cycle by one third.

Percent Water Loss Measurement: Body water loss can be measured by weighing the worker on a scale at the beginning and end of each workday. If total body weight loss exceeds 1.5% in a workday, increase fluid consumption.

Table III:4-4:

Heart Rate Recovery Pattern	*P_3*	*Difference between P_1 and P_3*
Satisfactory Recovery	*<90*	*----*
High Recovery(Condition may require further study)	*90*	*10*
No Recovery	*90*	*<10*

End of Help Text]

Physical signs and symptoms of heat stress are discussed with employees every (insert interval) and reviewed repeatedly, as necessary. Employees monitor each other's actions, speech and appearance for signs and symptoms of heat-related illnesses. Employees exhibiting signs or symptoms of heat exhaustion or heat stroke are (Insert actions taken when an employee is exhibiting signs or symptoms of heat exhaustion or heat stroke here, for example medical referral, hydration, and break procedures).

The physician's written opinion specifically addresses fitness for duty for employees who will work at temperatures at or above XX°F/ XX°C. This evaluation is described in Chapter 5, Medical Surveillance.

Liquid Replacement Program

Since dehydration is a primary cause of heat illness, employees on this site follow the regimen for liquid consumption detailed in Table 8-2d.

Table 8-2d Liquid Replacement Regimen			
Work Area Air or Adjusted Temperature Range	Work Period Between Drinks	Minimum Quantity (Ounces)	Liquid Type
	minutes	oz.	

[Help Text - A liquid replacement regime is not based on thirst. Employees need enough liquid and electrolytes to maintain their normal body weight throughout the day. Some sports drinks may exacerbate problems for some employees with certain medical conditions. Carbonated beverages are not recommended as a primary beverage for replacing body fluid because many contain caffeine and the gas makes them difficult to drink in large quantities.

The OSHA Technical Manual provides the following guidance: Make cool (50° - 60?F) water or any cool liquid (except alcoholic beverages) available to workers to encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Provide ample supplies of liquids close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets.]

Acclimatization Program

Acclimatization increases physical tolerance to warm climates by improving the circulatory system and balance of salt in the body. Employees that are newly hired, have not worked in a comparable environment during the previous (insert number) days, or have been away from this site (vacation or sickness) for the same period of time follow the acclimatization procedures identified in Table 8-2e.

Table 8-2e Worker Acclimatization Procedures

Worker Status	Heat Condition	Procedures
Full-time	Sudden increase in air temperature, humidity, workload, or PPE	
Newly-hired or after extended absence from site or sickness	Warm, with PPE	
Newly-hired or after extended absence from site or sickness	Hot	

[Help Text: Employees need time to become acclimatized—usually about seven days. Acclimatization may start to decline in as little as four days. Alcohol or other drugs may affect the body's ability for acclimatization. References highlighted earlier recommend the following alternatives for developing and implementing site acclimatization procedures.

The OSHA Technical Manual indicates the following:

A properly designed and applied acclimatization program decreases the risk of heat-related illnesses. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods. NIOSH (1986) says that, for workers who have had previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50% exposure on day one, 60% on day two, 80% on day three, and 100% on day four. For new workers who will be similarly exposed, the regimen should be 20% on day one, with a 20% increase in exposure each additional day.

The U.S. EPA's Guide to Heat Stress in Agriculture provides guidance in Table 4:

Worker Status	*Heat Condition*	*Procedures*
Full-Time	*Gradual Warming*	*None*
Full-Time	*Sudden increase in air temperature, humidity, workload, or level of protection*	*1. Cut work in hotter conditions to ½ the usual time. For balance of day, work in cooler environment or lighten workload.* *2. Increase time working in hotter conditions by an hour each day.*
Newly hired, returning after >3 week leave, returning after illness	*Warm; protective gear is worn* *Hot*	*1.* ***Light-to-moderate work****: Start work in the heat for maximum of two 60-minute periods each day. For balance of day, work in cooler environment or lighten workload.* ***Moderate-to-heavy work:*** *Start work in the heat for maximum of two 50-minute periods each day. For balance of day, work in cooler environment or lighten workload.* *2. Increase time working in the heat gradually by 1 hour/day until full acclimatization is approached (average 5-7 days).*

The "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" provides a NIOSH reference different from that noted in the OSHA Technical Manual. According to this Manual, "NIOSH recommends a progressive 6-day acclimatization period for him/her to do full work on a hot job. Under this regimen, the first day of work on site is begun using only 50 percent of the anticipated workload and exposure time, and 10 percent is added each day through day 6. With fit or trained individuals, the acclimatization period may be shortened 2 or 3 days. However, workers can lose acclimatization in a matter of days, and work regimens should be adjusted for to account for this."

References vary regarding the specific period away from work (illness or vacation) that may result in a worker's loss of acclimatization. The OSHA Technical Manual indicates that acclimatization may be lost over a matter of days. NIOSH's Criteria Document for Work in Hot Environments indicates that "absence from work in the heat for a week or more results in a significant loss" in the adaptive changes acquired as a result of acclimatization. NIOSH also notes that these workers may regain heat acclimatization in 2-3 days after returning to work. Other references, like the Mine Safety and Health Administration's (MSHA) Heat Stress in Mining, identify compressed acclimatization schedules for employees that return after 9 days away from work in a cooler climate. NIOSH and MSHA note that workers returning from an illness may not be at the same level of hydration or physical fitness they were when initially acclimatized; this is a consideration when they return to work in a hot environment.]

Use of Warm Temperature Cooling Garments:

In addition to the work practices and physiological monitoring described above, employees use cooling garments to reduce the risk of heat related illnesses and injuries. Employees don the appropriate cooling garments based on the guidelines provided in Table 8-2f.

Table 8-2f Use of Cooling Garments

Work Area Air or Adjusted Temperature Range	Task	PPE Level	Cooling Garment Used

[Help Text: Cooling garments may provide additional protection for employees working in hot environments. Garments have advantages and disadvantages, so consider their use carefully. The OSHA Technical Manual notes that ice vests may provide cooling for 2-4 hours and maintain maximum worker mobility, but they are also heavy. The manual also notes that air circulation systems are the most highly effective cooling systems but may be noisy and can limit the mobility of workers when suits are attached to an airline. These systems, as with all PPE, provide additional protection but do not replace the administrative controls identified earlier. They may be most effective for workers in higher levels of protection doing tasks requiring limited movements.]

8.3 Training:

Employees receive general training regarding heat stress-related injuries and illnesses during initial HAZWOPER training and subsequent refresher training. The site-specific program and procedures are communicated as identified in Chapter 4, Training.

8.4 References

(This section is optional. You may include these references in your program if you wish.)

A Guide to Heat Stress in Agriculture (1993, U.S. Environmental Protection Agency, Prevention, Pesticides, and Toxic Substances, Publication No. EPA-750-b-92-001)

Managing the Heat in Florida (1995, The State of Florida Department of Labor and Employment Security Division of Safety)

1999 TLVs and BEIs (1999, The American Conference of Governmental Industrial Hygienists)

NIOSH *Criteria for a recommended standard . . . occupational exposure to hot environments - revised criteria*. (1986, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 86-113.)

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National

Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 85-115)

Corporate SOP, see Chapter 12 of this HASP