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## 1.0. PURPOSE

- 1.1. These guidelines provide INGAA Foundation members with the framework to develop or augment a Heat Injury/Illness Prevention program.
- 1.2. These guidelines are not meant to supersede or replace regulatory requirements, nor is it intended to be all inclusive of the applicable regulatory requirements. Instead, view this information as supportive and complementary to any operating requirements.

## 2.0. SCOPE

- 2.1. This document specifies the minimum requirements for Heat Injury/Illness Prevention, including development of site-specific Heat Injury/Illness Prevention Plans.
- 2.2. While this guideline sets out the best practices for mitigating Heat Injury/Illness hazards associated with pipeline construction, and natural gas operations and support activities, each company should verify whether there are specific state/local regulatory requirements for the development of a Heat Injury/Illness Prevention program.

## 3.0. DEFINITIONS

- 3.1. **Heat Stress** – The net heat load to which a worker is exposed. Physical exertion, environmental factors, and clothing worn all contribute to heat stress.
- 3.2. **Heat Strain** – The body's physiological response to heat stress (e.g., sweating).
- 3.3. **Heat Stroke** - The most serious heat-related illness and should be treated as a medical emergency. Heat stroke occurs when the body becomes unable to adequately dissipate heat, losing the ability to regulate core body temperature. The core body temperature rises rapidly, the sweating mechanism may fail, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 41°C (106°F) or higher within 10 to 15 minutes. Thinking clearly, perception, planning, and other mental processes become impaired, and the worker may be unable to recognize dangerous situations. Heat stroke can cause death or permanent disability if emergency medical treatment is not given. Symptoms include confusion, clumsiness, slurred speech, fainting/unconsciousness, hot dry skin, profuse sweating, seizures, and high body temperature.



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- 3.4. **Heat Exhaustion** is often a precursor to heat stroke. It is often accompanied by elevated core body temperatures around 38°C–39°C (100.4°F–102.2°F). Symptoms may include headache, nausea, dizziness, fatigue, weakness, thirst, heavy sweating, irritability, and a decreased urine output.
- 3.5. **Heat Cramps** are caused by the body's depleted salt and water levels from excessive sweating resulting in muscle cramps or spasms. They usually occur in the muscles used during work. The symptoms include spastic contractions and pain in voluntary muscles mainly in the arms, legs, or torso.
- 3.6. **Heat Syncope** usually occurs after prolonged standing or sudden rising from a sitting or supine position. Heat syncope symptoms include light-headedness, dizziness, and fainting. Dehydration and inadequate acclimatization often contribute to heat syncope.
- 3.7. **Heat Rash** is skin irritation caused by excessive sweating. Excessive moisture and sweat obstructs sweat ducts and forms itchy and painful red pimple/blister clusters and skin lesions. It is exacerbated in hot and humid weather and common on the neck, chest, groin, armpits, elbow creases, and behind the knees.
- 3.8. **Heat Wave** is a period of abnormally hot weather above historical averages generally lasting more than two days.
- 3.9. **Heat Index** is the perceived temperature by a person accounting for temperature and humidity, in shaded areas. Exposure to sunlight can increase this value by up to 15°F.
- 3.10. **Rhabdomyolysis** is a medical condition, sometimes caused by heat stress and prolonged physical exertion, in which muscle fibers rapidly break down, die, and release electrolytes and proteins into the bloodstream. Left untreated, this can lead to kidney damage, seizures, irregular heart rhythms, and death. Symptoms include muscle cramps, muscle pain, dark urine, weakness, inability or decreased ability to perform physical exercise at the normally expected level or duration (i.e., exercise intolerance), and joint pain/stiffness. Rhabdomyolysis is usually diagnosed when hospitalized using a test that measures elevated levels of a muscle protein called creatine kinase in the blood, abbreviated CK or CPK.



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## 4.0. RESPONSIBILITIES

### 4.1. Management Responsibilities

4.1.1. Management shall provide necessary tools and support to administer an effective heat stress management program.

### 4.2. Supervisor Responsibilities (includes all personnel on site with a supervisory role)

4.2.1. Supervision is responsible for evaluating work activities for potential heat stress, and for recommending appropriate corrective actions.

### 4.3. Safety Department

4.3.1. The safety department will assist local management in developing and evaluating the effectiveness of the local/site-specific heat injury/illness prevention plan.

### 4.4. Workers

4.4.1. Employees are responsible for maintaining an awareness of the hazards of elevated temperatures, and for recognizing heat illness in themselves or co-workers.

## 5.0. PLANNING AND PREPARING FOR HEAT INJURY/ILLNESS PREVENTION

5.1. Local Leadership, with the assistance of the Safety Department, shall assess all work activities with potential heat stress hazards and develop and implement appropriate mitigation efforts. Using information from the Heat Injury and Illness Prevention Page and References section, each job site or facility shall prepare a site-specific or work-group-specific Heat Injury/Illness Prevention Plan that addresses heat and high temperature hazards, control measures, and mitigation efforts to reduce hazards.

5.1.1. Every job, site-specific, and work-group-specific Heat Injury/Illness Prevention Plan shall also include measures for responding to heat-related illnesses and/or heat injuries. See Appendix A – Site-Specific Heat Injury/Illness Prevention Plan for a recommended template.

5.1.2. Review plans annually and update, as necessary. See the Documentation section.



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## 6.0. TRAINING

- 6.1. Employees should be trained to recognize the signs and symptoms of heat injury/illness in themselves and others.
- 6.2. Communicate the requirements of the Heat Injury/Illness Prevention Plan to all impacted employees – and others visiting the location who are exposed to the heat related hazards. Repeat and reinforce these requirements as frequently as necessary to ensure the implementation of the plan.
- 6.3. All training shall be documented and in accordance with company specific requirements.

## 7.0. DOCUMENTATION

- 7.1. Use Appendix A – Site-Specific Heat Injury/Illness Prevention Plan template (or equivalent) to identify and document heat-related hazards, mitigating controls, and responses to symptoms of actual heat injuries/illness.
- 7.2. Review the site-specific plan annually to ensure the completeness and accuracy of the plan and document according to company specific requirements.

## 8.0. REFERENCES

- 8.1. American Conference of Governmental Industrial Hygienists, ACGIH (2019): "2019 Threshold Limit Values and Biological Exposure Indices" ACGIH (Cincinnati) pg. 239-248.
- 8.2. American Heart Association
- 8.3. FEMA - [Extreme Heat | Ready.gov](#)
- 8.4. National Integrated Heat Health Information System ([NIHHIS](#))
- 8.5. National Weather Service - Heat Safety Tips and Resources ([weather.gov](#))
- 8.6. OSHA Heat Illness Prevention Campaign | Occupational Safety and Health Administration ([osha.gov](#))
- 8.7. [OSHA-NIOSH Heat Safety Tool App](#) | NIOSH | CDC for both Android and Apple mobile devices
- 8.8. [NIOSH Work Rest Schedules](#)
- 8.9. Department of Homeland Security – [Heat Stress Pocket Guide](#)



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## 9.0. ATTACHMENTS

- A. Job or Site-Specific Heat Injury/Illness Prevention Plan (template)
- B. Heat injury/illness prevention plan strategies

## 10.0. HISTORY OF REVISIONS

Revision	Date	Description
0	7/11/2023	Initial Issue



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**Attachment A**

**Job or Site-Specific Heat Injury/Illness Prevention Plan**

**Job Site / Facility / Workgroup:** \_\_\_\_\_

**Plan Last Revised Date:** \_\_\_\_\_

This document contains the site-specific plan for the named facility/workgroup to reduce heat-related injuries/illness. Each facility should prepare/update their plan annually and communicate the plan to employees before high ambient temperature conditions occur.

Local supervision has the authority and responsibility for implementing the provisions of this program.

**1. Summary of Heat-Related Conditions and Hazards at this Location (Hazard Recognition)**

*<<This section should discuss date/time periods where significant heat injury risk is possible, areas of the facility where additional hazards exist – such as poorly ventilated areas, areas without shade, confined spaces, etc.>>*

**2. Additional Heat Injury Risk Associated with PPE**

*<<Use this area to discuss PPE-related hazards such as FRC, chemical protective clothing, and other PPE that may increase the risk of heat injury and how that risk will be mitigated.>>*

**3. Procedures for Provision of Water**

*<<Insert procedures used at this facility>>*

**4. Procedures for Access to Shade**

*<<Insert procedures used at this facility>>*

**5. Procedures and Responsibility for Monitoring the Weather**

*<<Insert procedures used at this facility and who is responsible>>*

**6. Procedures for Mitigating Hazards Associated with a Heat Wave**

*<<Insert procedures used at this facility>>*

**7. High Heat Procedures**

*High Heat Procedures are additional preventive measures that the facility/work group will use when the temperature equals or exceeds 95° F, or the heat index equals or exceeds 90° F.*



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<<Insert procedures used at this facility>>

**8. Procedures for Acclimatization**

<<Insert procedures used at this facility>>

**9. Other Procedures for Consideration**

*This section should include any other considerations that should be addressed when developing a plan to mitigate heat injury illness.*

<<Insert procedures used at this facility>>

**10. Procedures for Emergency Response**

<<Insert procedures used at this facility>>

**11. Procedure for Assisting a Sick Employee**

<<Insert procedures used at this facility>>

**12. Procedures for Training**

<<Insert procedures used at this facility>>

**13. Record of Plan Revisions**

Review this Heat Related Illness Prevention Plan on an annual basis; amend if necessary. Document amendments and/or reviews on the table below. Amend the plan if any changes in job site, facility design, construction, or operation affect the risk of work-related heat illness.

Date	Section(s)	Description of Change	Reviewed/Revised by



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**Attachment B**

**Heat Injury/Illness Prevention Plan Strategies**

Below are heat stress/injury prevention strategies that may be used to develop the Jobsite, Facility, or Work Group Specific Heat Injury/Illness Prevention Plan.

**Strategies for the mitigation of PPE related heat hazards:**

When air temperature, heat index, or when there is an intense radiant heat source, some form of PPE or auxiliary body cooling may be considered. Examples include:

- Cooled fluid or ice-cooled clothing
- Air-cooled garments (i.e., vortex tube)
- Wetted over garments, such as terrycloth or cotton when using impermeable clothing, such reflective clothing or aprons

Consideration should be given to the effect some forms of PPE may have on increasing the hazard of heat-related injury/illness. This is not a justification for reducing the PPE requirement but should result in adjustments to work/rest cycles and other mitigation efforts.

**Strategies for the provision of water:**

- Ensure adequate fluid replacement when working in hot environments since workers will lose water due to sweating. Thirst is not a reliable indicator of body fluid need. Encourage employees to maintain fluid levels by drinking small quantities (5-8 oz. or 0.15-0.24 liters) of cool water every 20-30 minutes.
- Employees shall have access to potable drinking water. Where it is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. The shift may begin with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow employees to drink one quart or more per hour.
- Encourage the frequent drinking of water. Electrolyte replacement fluids may also be used but should not be the only source of fluids available. Two bottles of water for every bottle of electrolyte replacement fluid are recommended.
- Keep water cool or cold.
- Coolers containing bottled water and ice should be available to encourage the frequent drinking of liquids. NOTE: Coolers and containers shall be maintained in a sanitary condition.



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### Strategies to provide access to shade:

- Provide employees access to shade through measures such as pop-up tents, umbrellas, or cooling trailers. NOTE: Do not use the interior of a vehicle to provide shade unless the vehicle is air-conditioned, and the air conditioner is on with the parking brake set.
- The amount of shade present shall be at least enough to accommodate the number of employees on recovery or rest periods so that they can sit in a normal position fully in the shade without having to be in physical contact.
- Daily tailgate safety meetings shall include information on the location of the shade structures and encourage employees to use them at regularly scheduled intervals.
- Shade structures will be relocated to follow along with the crew and will be placed as close as practical to the employees so that access is always provided. Local site-specific procedures should specify a maximum distance that shade structures should be located away from the employees, but in no case should a shade structure be located more than 1,000 feet from the employees.
- In situations where it is not safe or feasible to provide access to shade (e.g., during high wind), take alternate steps to provide relief by increasing rest periods or access to cooling areas.

### Strategies to monitor the weather:

- Weather forecasts can be checked online at <http://www.nws.noaa.gov/>, The Weather Channel, smartphone apps, or any local television station. Work schedules and activities should be planned, taking into consideration when high temperatures or a heat wave is expected. This type of advanced planning should take place throughout the summer.
- Prior to each workday, review and compare the forecasted temperature and heat index for the facility against the National Weather Service Heat Index to evaluate the risk level for heat injury/illness.
- Identify who will be responsible for weather monitoring and communicating updates to affected parties.

### Strategies to mitigate the hazards related to heat waves:

- During a heat wave, management shall review the possible hazards associated with heat injury/illness and take appropriate action.
- Hold meetings during a heat wave before starting work to review the site-specific heat injury/illness prevention procedures. Review the weather forecast and emergency response procedures at this time and if schedule modifications are not possible, provide employees with an increased number of rest breaks in the shade,



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water, and observe closely for signs and symptoms of heat injury/illness. Remind all employees of Stop Work authority.

- When feasible, consider having employee’s work in teams or groups in order to be on the lookout for signs and symptoms of heat injury/illness and to ensure that emergency procedures are initiated when someone displays signs or symptoms of heat injury/illness.
- During a heat wave, employees should be observed closely (or maintain frequent communication via appropriate media) to be on the lookout for possible heat injury/illness symptoms.

**Strategies to implement during high heat conditions:**

- Maintain effective communication by voice, observation, or electronic means such as a radio or cell phone so that employees can contact a supervisor when necessary.
- Maintain frequent and scheduled communication with employees in smaller groups and lone workers to be on the lookout for symptoms of heat injury/illness.
- Where employees work with other employees or in small groups, observe employees for altered mental states, signs, and symptoms of heat injury/illness. Supervisors should designate a responsible person to look for signs and symptoms of heat injury/illness.
- Ensure employees take a minimum 15-minute preventative cool-down rest break in the shade at least every two hours, regardless of the length of shift.
- Allow employees time to gradually acclimate to working at sites where the ambient temperature exceeds the heat index of 90°F (refer to Table 1 – Recommended Work/Rest Cycle).



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Temperature (°F)	Light Work Work/Rest (min)	Moderate Work Work/Rest (min)	Heavy Work Work/Rest (min)
<95	Normal	Normal	Normal
95-100	Normal	Normal	45/15
101-103	Normal	45/15	30/30
104-105	Normal	30/30	15/45
106-107	45/15	15/45	Caution
108-109	30/30	Caution	Caution
>109	Caution	Caution	Caution

**Table 1: Recommended Work/Rest Cycle**

**Examples of work intensity levels**

Light Work	Moderate Work	Heavy Work
Operating Equipment	Jack-leg drilling	Climbing
Inspection Work	Installing ground support	Carrying equipment over 40 pounds
Walking on flat level ground	Carrying equipment between 20-40 pounds	Installing utilities
Using light hand tools (wrenches, pliers etc.), may be moderate depending on task	Using hand tools (shovels, fin-hoe, scaling bar) for short periods	Using hand tools (shovels, fin-hoe, scaling bar) for extended periods

- Remind employees throughout the work shift to drink plenty of water. (refer to Table 2 – Recommended Hydration)

Temperature (°F)	Light Work Quarts per Hour	Moderate Work Quarts per Hour	Heavy Work Quarts per Hour
90-95	½	1	1 ¼
96-103	¾	1 ¼	1 ¼
>104	1	1 ½	1 ½

**Table 2: Recommended Hydration**



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- Pay particular attention to new employees (less than 14 days) and assign a “buddy” or more experienced coworker to them.
- Precautions for Lone – workers.
  - Set up regular check-ins with their supervisor. To include at least:
    - Beginning of shift – to confirm lone worker is fit for duty and has a plan for mitigating heat exposure and check-in schedule.
    - Mid shift check-in
    - End of shift check-in

### **Strategies to assist teammate’s acclimation to the heat:**

- The local supervisor or their delegate shall monitor the weather daily and discuss it at pre-shift meetings. They will also monitor for sudden heat waves or an increase in temperatures to which employees have not been exposed to for two weeks or longer. Account for the additional heat exposure from hot process equipment indoors and out.
- The supervisor should be vigilant with new employees and stay alert to the presence of heat-related illness symptoms.
- During increased temperatures assign new employees a “buddy” or experienced coworker to watch new employees closely for discomfort or symptoms of heat injury/illness.

### **Strategies to mitigate workplace specific conditions:**

- Strategy for workplaces where process equipment is the primary source of heat.
  - Identify primary sources of heat from operation units to determine if heat stress-related problems exist on a routine basis.
  - Consider environmental temperature, humidity, work activity by an employee, and the frequency and duration of the work activity.
  - If a heat-related issue is identified, develop a strategy for reducing the risk or burden of heat stress such as adding additional shielding, ventilation, or air conditioning to the area.
- Strategy for heat stress issues in confined spaces.
  - Give heat stress special consideration when performing work in confined spaces due to the numerous unique factors which can contribute to increasing the risk of developing a heat-related illness.
  - Ventilation, additional moisture, the color of the outside surface of the tank or vessel (i.e., black tanks absorb more environmental heat, whereas



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white tanks reflect environmental heat), number of entrants, process heat (i.e., allow time for hot processes to cool, if possible), rescue procedures, equipment needs, etc. are all issues that should be considered.

### **Strategies to respond to heat-related illnesses at the workplace:**

- When an employee is showing symptoms of possible heat injury/illness, the employee's teammates will take immediate steps to keep the stricken employee cool and comfortable in a shaded location (to reduce the progression to a more serious heat illness).
- During a heat wave or high temperatures, all employees will be reminded to immediately report to their supervisor any signs and symptoms of heat illness they or a teammate are experiencing. Communicate this requirement on a frequent basis throughout the shift.

### **Strategies for caring for a sick teammate:**

- When an employee displays possible signs and symptoms of heat injury or illness, immediately move the employee to a shaded area and provide cool water. Move the affected employee into a shaded area to acclimate before moving into an air-conditioned space.
- In the event of severe illness, such as heat stroke, provide fluids only if the person is alert and able to drink. Call 911.
- Assign someone to stay with the sick employee in the shade, as they can take a turn for the worse.