

HEAT STRESS IN THE CONSTRUCTION INDUSTRY

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Today's Webinar



OUR TEAM for today's presentation



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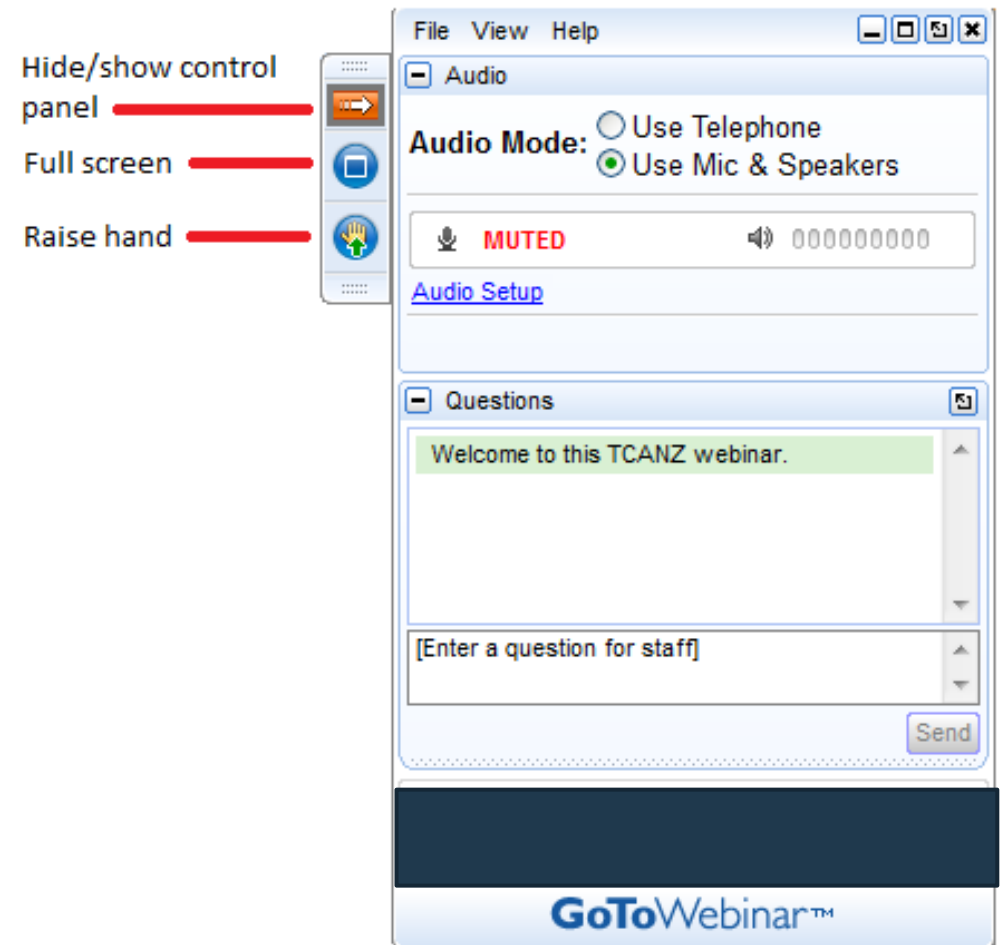


STEVE CREWS

VICE PRESIDENT

Housekeeping

- This presentation is being recorded and will be shared.
- Everyone will be muted to prevent background noise.
- Use the question button to log your question.



Today's Topics

- Heat Stress Prevention Plan (HSPP) for Construction
- Responsibilities
 - Employer
 - Foreman / Supervisor
 - Employee
- Solutions to Heat Stress



Heat Stress Prevention Plan (Construction)

- Administrative controls and work/rest schedules
- Acclimatization of employees
- Observation and monitoring
- First aid and emergency response
- Employee training



Administrative Guidance for HSPP

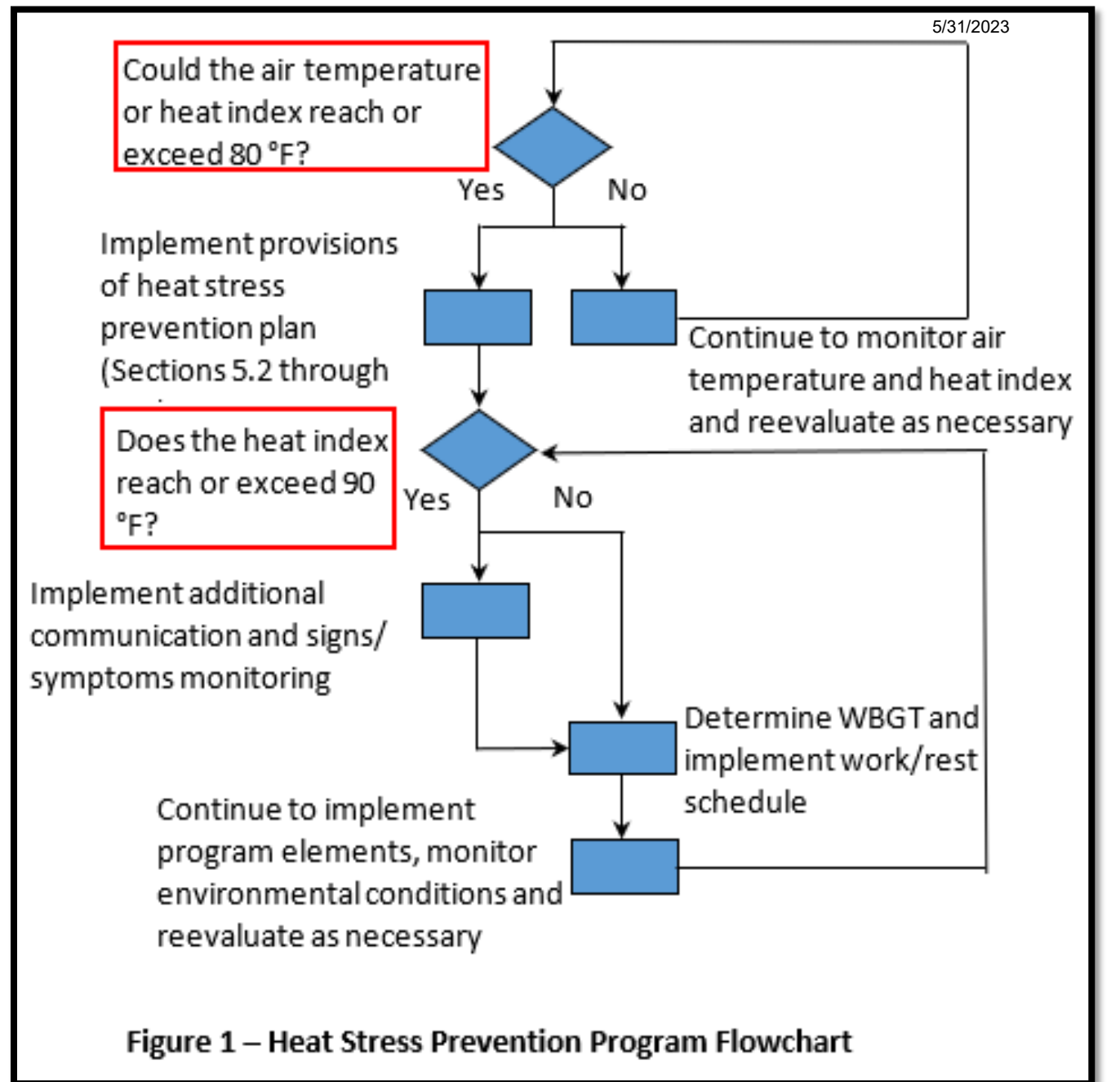


Figure 1 – Heat Stress Prevention Program Flowchart

Heat Exposure Monitoring (Administrative)

Table 1 – Heat Index

		Air Temperature (Degrees F)																
		78	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
Relative Humidity (%)	0	76	78	79	80	81	82	84	85	87	88	90	91	93	95	96	98	99
	5	76	78	79	80	81	83	84	86	87	89	91	93	94	96	98	100	101
	10	76	78	79	81	82	84	85	87	89	90	92	94	96	98	100	102	104
	15	76	78	80	81	83	84	86	88	90	92	94	96	98	100	103	105	108
	20	76	79	80	81	83	85	86	88	90	93	95	97	100	103	106	109	112
	25	77	79	80	82	83	85	87	89	91	94	97	100	103	106	109	113	117
	30	77	79	80	82	84	86	88	90	93	96	99	102	106	110	114	118	122
	35	77	80	81	82	85	87	89	92	95	98	102	106	110	114	119	123	129
	40	77	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
	45	78	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
	50	78	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
	55	78	81	84	86	89	93	97	101	109	112	117	124	130	137			
	60	78	82	84	88	91	95	100	105	110	116	123	129	137				
	65	79	82	85	89	93	98	103	108	114	121	128	136					
	70	79	83	86	90	95	100	105	112	119	126	134						
	75	80	84	88	92	97	103	109	116	124	132							
	80	80	84	89	94	100	106	113	121	129								
85	80	85	90	96	102	110	117	126	135									
90	80	86	91	98	105	113	122	131										
95	81	86	93	100	108	117	127											
100	81	87	95	103	112	121	132											

Adapted from U.S. Dept. of Commerce National Oceanic and Atmospheric Administration, National Weather Service

Heat Index Hazard Levels

Heat Risk Category	Heat Index	Effects on Body
Low/Minimal Risk	<80 °F	Limited risk of heat-related illness for most healthy, acclimatized employees. However, some employees could be at risk if they are unacclimatized, have certain underlying health conditions or are wearing heavy clothing or PPE
Caution	80 °F to 90 °F	Fatigue possible with prolonged exposure and/or physical activity. The provisions of the Heat Stress Prevention Program apply.
Moderate	90 °F to 103 °F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity. Additional communication with employees and signs/symptoms monitoring are required (refer to Section 5.8)
High	103 °F to 115 °F	Heat cramps or heat exhaustion likely, and heat stroke is possible with prolonged exposure and/or physical activity
Very High to Extreme	116 °F or Higher	Heat stroke highly likely

Work / Rest Schedules & Water Intake

TABLE 4 – Effective WBGT Work/Rest Schedules and Water Intake

Heat Risk Category		Effective WBGT	LIGHT WORK		MODERATE WORK		HEAVY WORK	
			Minutes of Work/Rest per Hour	Water Intake (Quart/Hr.)	Minutes of Work/Rest per Hour	Water Intake (Quart/Hr.)	Minutes of Work/Rest per Hour	Water Intake (Quart/Hr.)
Low/ Minimal Risk	Unacclimatized	78 to 79.9 °F	50 / 10 Min	½	40 / 20 Min	¾	30 / 30 Min	¾
	Acclimatized		Continuous	½	Continuous	¾	50 / 10 Min	¾
Caution	Unacclimatized	80 to 84.9 °F	40 / 20 Min	½	30 / 30 Min	¾	20 / 40 Min	1
	Acclimatized		Continuous	½	50 / 10 Min	¾	40 / 20 Min	1
Moderate	Unacclimatized	85 to 87.9 °F	30 / 30 Min	¾	20 / 40 Min	¾	10 / 50 Min	1
	Acclimatized		Continuous	¾	40 / 20 Min	¾	30 / 30 Min	1
High Risk	Unacclimatized	88 to 90 °F	20 / 40 Min	¾	10 / 50 Min	¾	Avoid	1
	Acclimatized		Continuous	¾	30 / 30 Min	¾	20 / 40 Min	1
Very High to Extreme	Unacclimatized	>90 °F	10 / 50 Min	1	Avoid	1	Avoid	1
	Acclimatized		50 / 10 Min	1	20 / 40 Min	1	10 / 50 Min	1

First Aid / Emergency Response (partial)

Table 5 – Heat-Related Illness Symptoms and First Aid/Emergency Response Guidance

Condition	Symptoms	First Aid or Emergency Response
<p>Heat stroke is the most serious heat-related disorder. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106 degrees Fahrenheit or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not given.</p>	<ul style="list-style-type: none"> • Hot, dry skin or profuse sweating • Seizures • Loss of consciousness (coma) • Very high body temperature • Confusion/dizziness/slurred speech • Death if not treated immediately 	<ul style="list-style-type: none"> • Call 911 and notify a supervisor • Move the sick worker to a cool shaded area and remove outer clothing • Circulate the air around employee • Cool the worker using methods such as: <ul style="list-style-type: none"> ○ Soaking their clothes with water ○ Spraying, sponging, or showering them with water ○ Fanning their body
<p>Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Workers most prone to heat</p>	<ul style="list-style-type: none"> • Heavy sweating • Extreme weakness or fatigue • Dizziness, confusion, nausea, headaches 	<ul style="list-style-type: none"> • Have them rest in a cool, shaded or air conditioned area

Heat Stress Prevention Plan (Training)

- Administrative Controls
- Engineering Controls
- Solutions (Water, electrolytes, food, breaks, etc.)
- First Aid / Emergency Response
- Signs / Symptoms
- Supervisory Procedures



Responsibilities

Employer

1. Implement Heat Stress Prevention Plan to all employees
2. Purchase water and additional supplements
3. Train employees

Supervisor

1. Follow / educate workforce on HSPP
2. Monitor daily weather
3. Provide water and additional supplements

Employee

1. Learn HSPP
2. Monitor your daily activity and listen to your body
3. Make responsible and educated decisions during your work shift



Types of Heat Stress (Ex. Construction)

Classic Heat Stress

Body is exposed to elevated heat levels through ambient conditions (outdoors or indoors)

Example: Traffic Controllers in road construction

Exertional Heat Stress

Physical activity warms the body and generates heat quicker than it can be dissipated

Example: Heavy-highway laborers



Standard Working Hours (Construction)

Types of Shifts (Day)

- 6:00AM – 1:30PM (Ex. Holiday)
- 7:00AM – 5:00PM (10 hour)
- 7:00AM – 3:30PM (8.5 hour)

Concerns

- No breaks, lunch (to leave early)
- (1) 15 min. break (9:30am)
- (1) 30 min. lunch
 - Exposed to more heat vs. early start
- Early start not allowing hydration time
- Often employees drinking coffee / energy drinks to 7:00AM

Case Study #1

1. Gender, age, weight, height
 - ✓ Male, 48, 6'4, 280 lb.
 2. Work day / weather:
 - ✓ Friday, 92 degrees
 3. 7:00 AM:
 - ✓ 2 donuts, coffee, energy drink
 4. 9:30 AM:
 - ✓ 1 donut, protein shake
- **Case:** Worker collapsed into cardiac arrest at 10:00AM shortly after break
 - **Diagnosis:** After 10 minutes of CPR and eventual AED, employee survived and doctors claimed sugar intake / heat exposure was contributory causes
 - **Solutions:** Water, electrolytes, less sugar consumption

Case Study #2

1. Work hours
 - ✓ 6:00AM – 1:30PM
 2. Breaks
 - ✓ None
 3. Holiday
 - ✓ Yes
 4. Concerns
 - ✓ No breaks
 - ✓ Work has to be at faster pace
 - ✓ No stopping for water or food
-
- **Solutions:** HSPP in effect, breaks, water + electrolytes

Case Study #3

1. New Laborer ✓Yes
2. Work Hours ✓8:00AM – 5:00PM
3. Acclimatized ✓No
4. New Hire Training on HSPP ✓No
5. Heat temp: 85-95 degrees ✓Yes
6. Employee construction knowledge: ✓No

Risk Severity = HIGH!!!

- **Solutions:** HSPP in effect, training, breaks for new hires, water + electrolytes

Solutions: Engineering



- Shaded / cooling areas
- Misting tents
- Increased air movement
- Barriers and shielding

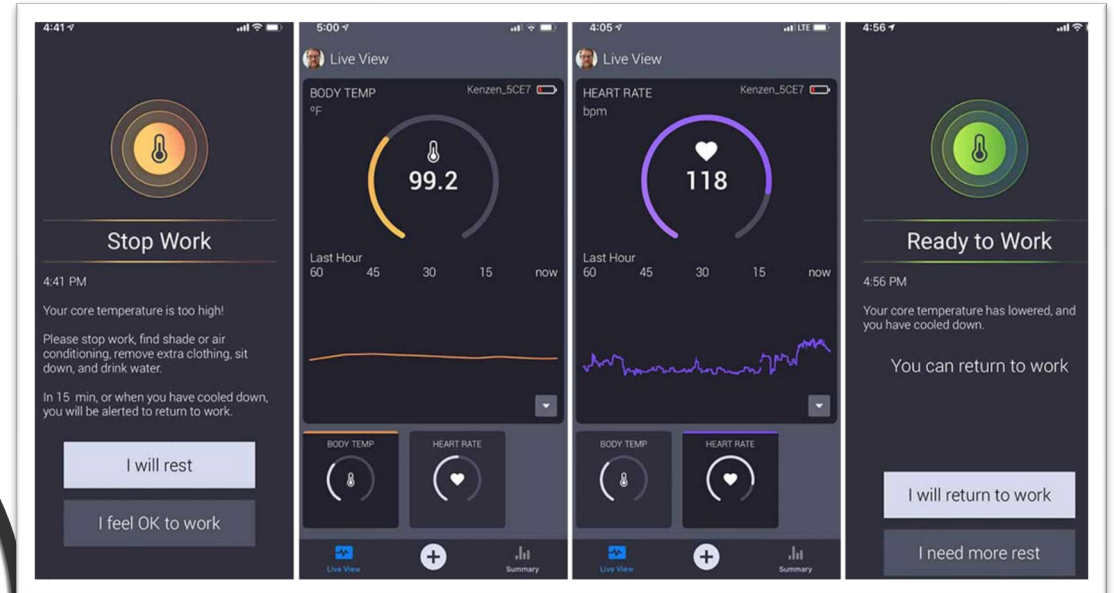
Solutions: Administrative

- Training
- Work / Rest Intervals
- Required acclimatization periods
- Job Rotation
- Schedule shifts and tasks at cooler times
- Alter crew size

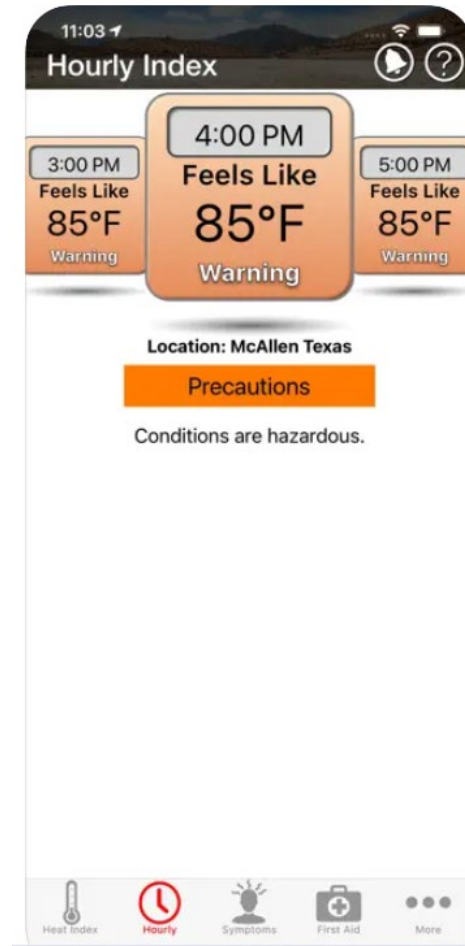
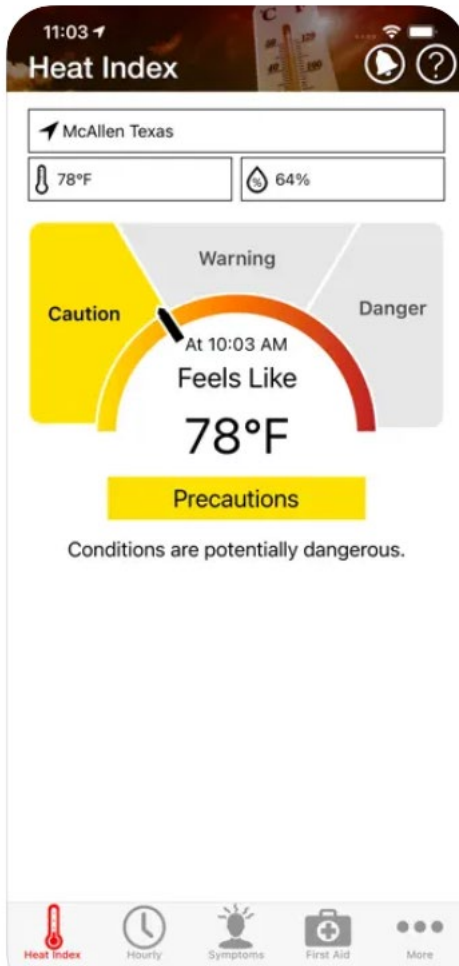
Temperature (°F)	Light Work Minutes Work/Rest	Moderate Work Minutes Work/Rest	Heavy Work Minutes Work/Rest
90	Normal	Normal	Normal
91	Normal	Normal	Normal
92	Normal	Normal	Normal
93	Normal	Normal	Normal
94	Normal	Normal	Normal
95	Normal	Normal	45/15
96	Normal	Normal	45/15
97	Normal	Normal	40/20
98	Normal	Normal	35/25
99	Normal	Normal	35/25
100	Normal	45/15	30/30
101	Normal	40/20	30/30
102	Normal	35/25	25/35
103	Normal	30/30	20/40
104	Normal	30/30	20/40
105	Normal	25/35	15/45
106	45/15	20/40	Caution
107	40/20	15/45	Caution
108	35/25	Caution	Caution
109	30/30	Caution	Caution
110	15/45	Caution	Caution
111	Caution	Caution	Caution
112	Caution	Caution	Caution

Monitoring & Wearable Technology

- Body temperature
- Hydration
- Pulse
- Blood Pressure



OSHA App (iphone/Android)



1:16

First Aid

[En Español](#)

Heat Stroke

[Review the signs and symptoms of heat stroke](#)

- THIS IS A MEDICAL EMERGENCY: Call 911.
- Stay with the worker until help arrives.
- Move the worker to a shady, cool area.
- Remove outer clothing.
- Cool quickly with a cold water or ice bath if possible; wet the skin, place cold wet towels on skin, or soak clothing in cool water.
- Fan air around the worker.
- Place cold wet towels or ice on the worker's head, neck, armpits, and groin.



Heat Exhaustion

[Review the signs and symptoms of heat exhaustion](#)

- Take the worker to a clinic or emergency room for medical evaluation and treatment.
- If medical care is unavailable, call 911.
- Stay with the worker until help arrives.



Heat Index Hourly Symptoms First Aid More

Fluid Loss Chart

FLUID LOSS	RESULT
2%	Impaired performance
4%	Muscular function and capacity declines
6%	Heat exhaustion
8%	Hallucination
10%	Circulatory collapse and heat stroke

Dehydration – On the Job Dangers

Dehydration can cause:

- Lowered ENERGY LEVELS
 - 2-3% dehydration can result in a 20% decrease in energy levels
- Loss in CONCENTRATION & MEMORY
- HEADACHES & FATIGUE
- An impact on REACTION TIME
 - 3% dehydration is comparable to 0.08 BAC (blood alcohol level)



75% of US is Chronically Dehydrated

- Every day you lose water through your breath, perspiration, urine and bowel movements.
- For your body to function properly, you must replenish its water supply by consuming beverages and foods that contain water.
- OSHA recommends drinking 1 cup every 15-20 minutes when hazard is present
- Keep in mind these levels of intake on top of electrolytes, will increase as physical exhaustion occurs in heat exposed work sites.

Average man = 15.5 cups (3.7 L) water

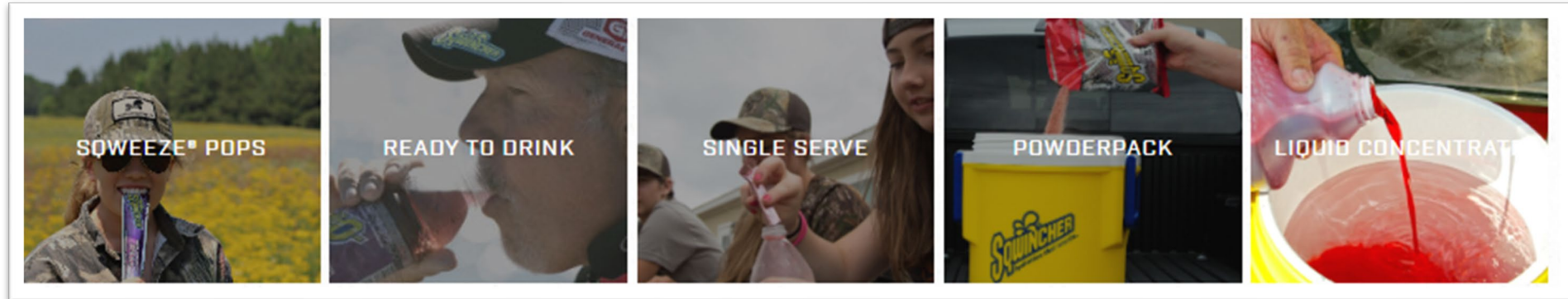


Average woman = 11.5 cups (2.7 L) water



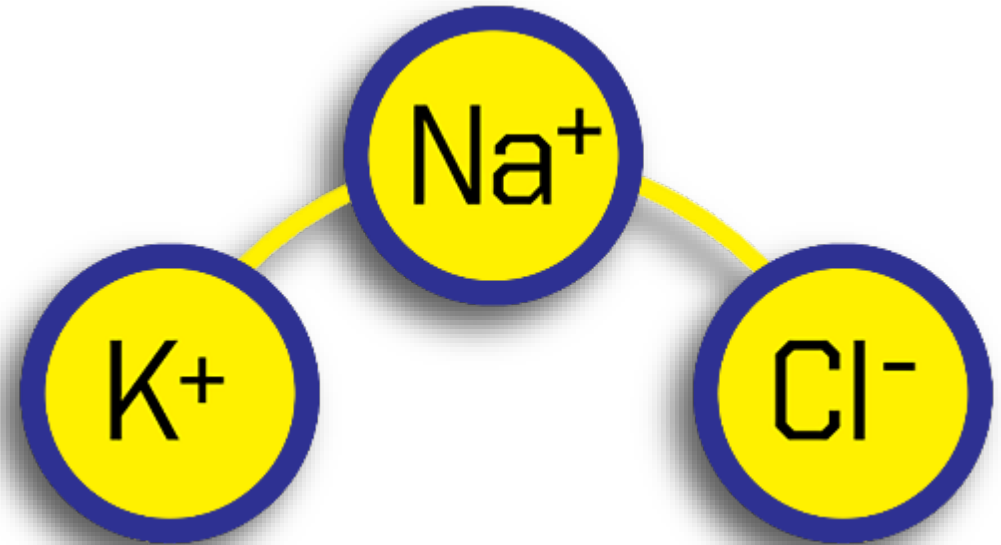
These recommendations cover fluids from water, other beverages and food. About 20 percent of daily fluid intake usually comes from food and the rest from drinks.

Electrolytes (In addition to supplied Water)



Electrolytes – Water is NOT Enough

- Electrolytes are minerals found in muscle cells
- Sodium – Potassium – Chloride
- Loss of body fluids = ELECTROLYTE LOSS
- The body does not produce electrolytes
- Water may contain only a trace amounts of electrolytes
- Replenishment of electrolytes is just as important as water



Formulation Index



SQUINCHER

Original Electrolyte Replenishment Formulation

EVERLYTE™

Reduced Sugar -
Reduced Calorie
Real Sugar
Clear Formulation

SQUINCHER ZERO

ZERO Sugar -
Minimal Carbs &
Calories Sweetened
with Sucralose

Formulation Index

Comparison below based on 12 fl oz – Powder Mix Formulations



Calories --- -	90
Carbs ----- -	22g
Sugar ----- -	22g
Sodium ----	65mg
Potassium --- -	50mg
	Regular Formulation

60
15g
14g
70mg
65mg
Reduced Sugar Formulation – No Colors or Preservatives

5
1g
0g
85mg
70mg
Sugar Free Formulation

Personal Protective Equipment



- Full-brim hard hat
- UV protective sunglasses and clothing
- Breathable outerwear
- Sunscreen
- Cooling Vests

Tips from the Professionals

- Mass text message alert (“95 Degrees Today, Hydrate and take breaks!”)
- New PPE (Contact One Solution)
- Modify work schedule aka “DON’T BE RIGID”
- Purchase proper electrolytes
- KNOW your projects and speak up with acclimatized / unacclimatized workers!



QUESTIONS?

THANK YOU!

