HEAT INJURY AND ILLNESS PREVENTION

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Unified by Purpose

NATIONAL Minority Supplier Development Council | DBE CERTIFIED | SBA U.S. Small Business Administration

ENABLING DISCUSSION OBJECTIVES

- Critical factors that can contribute to heat stress
- Determining heat hazard exposure risk
- Effective controls to mitigate heat stress
- OSHA heat initiatives & emphasis

HEAT STRESS FACTORS

HOW THE BODY HANDLES HEAT

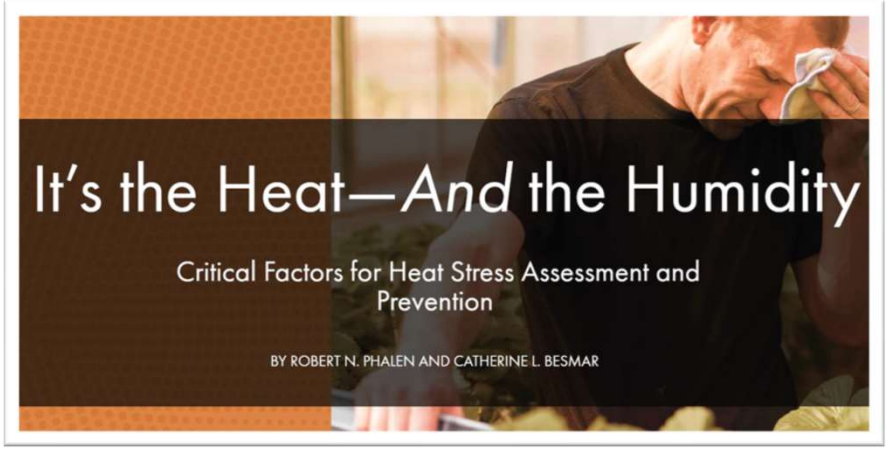
- Regulation by hypothalamus
- Increased heart rate
- Increased blood circulation to skin
- Evaporative cooling from sweating
- Heat dissipation from skin

Source: Stock Photo

FACTORS ASSOCIATED WITH HEAT STRESS

Critical Factors

1. Temperature
2. Air velocity
3. Humidity
4. Radiant heat
5. Clothing
6. Metabolic rate
7. Acclimatization



Source: https://synergist.aiha.org/202004-heat-and-humidity

FACTORS ASSOCIATED WITH HEAT STRESS

Temperature

- Elevated air temperatures affect body's ability to dissipate heat
- Heat flows from warm to cool
  - Conduction, Convection, Radiation

Humidity

- A ratio of how much water vapor is in the air compared to how much it can hold
- Percentile range from 0—100

Air Velocity

- Air velocity affects evaporative cooling and convective heat transfer
- Variable effect depending on air temperature relative to skin temperature

Radiant Heat

- Electromagnetic energy
- Transfers from warmer surfaces to cooler surfaces
- Can pass through the air without heating it significantly

FACTORS ASSOCIATED WITH HEAT STRESS (CONT'D)

Clothing

- Characteristics affect rates of heat dissipation and evaporative cooling
- Coverage may reduce radiant heat transfer

Metabolic Rate

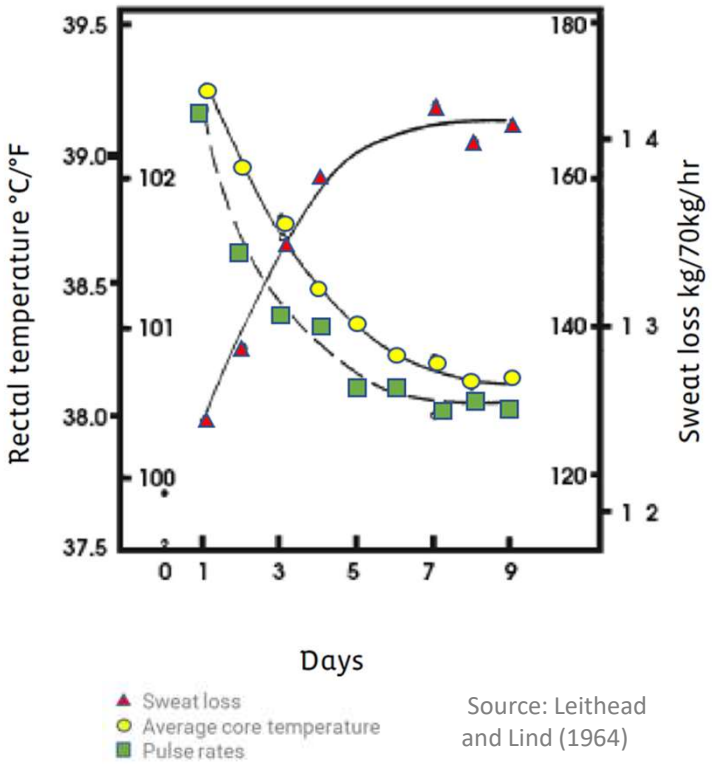
- Energy expenditure over time
- More exertion, more energy, more heat
- Individual differences matter

Acclimatization

- Progressive body adaptions to hot work environments
- Increased sweating -> increased evaporative cooling
- Increased skin blood flow -> increased convective heat transfer

ACCLIMATIZATION

- Progressive body adaptions to hot environments:
  - Increased sweating -> increased evaporative cooling
  - Increased skin blood flow -> increased convective heat transfer
  - Reduced heart rate
- 10-14 days needed to acclimate to hot environments
- Gradually increase exposure to hot environments
- Considerations for ‘re-acclimatization’



Source: Leithead and Lind (1964)

Source: https://www.cdc.gov/niosh/topics/heatstress/acclima.html

HEAT STRESS RISK FACTORS

Previous history of heat-related illness
Advanced age
Physical fitness
Medical conditions
Medications
Alcohol and/or drug use
Caffeine

Source: NIOSH – *Occupational Exposure to Heat and Hot Environments*

HEAT STRESS RISK FACTORS

- Some personal medical conditions and medications *may* increase risk of heat stress.
- Implications for pre-assignment physicals and accurate job descriptions to screen for heat intolerance.

Source: NIOSH – *Occupational Exposure to Heat and Hot Environments*
https://www.cdc.gov/niosh/docs/2016-106/default.html

Table 4-2. Drugs implicated in intolerance to heat

Drug or drug class	Proposed mechanism of action
Anticholinergics (e.g., benzotropine, trihexyphenidyl)	▪ Impaired sweating
Antihistamines	▪ Impaired sweating
Phenothiazines	▪ Impaired sweating, (possibly) disturbed hypothalamic temperature regulation
Tricyclic antidepressants (e.g., imipramine, amitriptyline, protriptyline)	▪ Impaired sweating, increased motor activity and heat production
Amphetamines, cocaine, ecstasy	▪ Increased psychomotor activity, activated vascular endothelium
Analgesics (e.g., acetaminophen, aspirin)	▪ Liver or kidney damage
Ergogenic stimulants (e.g., ephedrine/ephedra)	▪ Increased heat production
Lithium	▪ Nephrogenic diabetes insipidus and water loss
Diuretics	▪ Salt depletion and dehydration
Calcium channel blockers (e.g., amlodipine, verapamil)	▪ Reduced skin blood flow and reduced blood pressure
Ethanol	▪ Diuresis, possible effects on intestinal permeability
Barbiturates	▪ Reduced blood pressure
Antispasmodics	▪ Impaired sweating
Haloperidol	▪ Tachycardia, altered central temperature regulation, and hyponatremia
Laxatives	▪ Dehydration
Beta blockers (atenolol, betaxolol)	▪ Reduced skin blood flow, reduced blood pressure, and impaired sweating
Narcotics	▪ Excessive sweating, salt depletion and dehydration
Levothyroxine	▪ Excessive sweating, salt depletion and dehydration

Adapted from *Heat Stress Control and Heat Casualty Management* [DOD 2003].

CONTRIBUTING FACTORS TO HEAT STRAIN

Body Weight

- Heavier people have a higher metabolic rate
- Standards based on 154lb person
- Adjustment
  - ACGIH TLV for heat stress
  - OSHA Technical Manual

Work-Rest Schedule

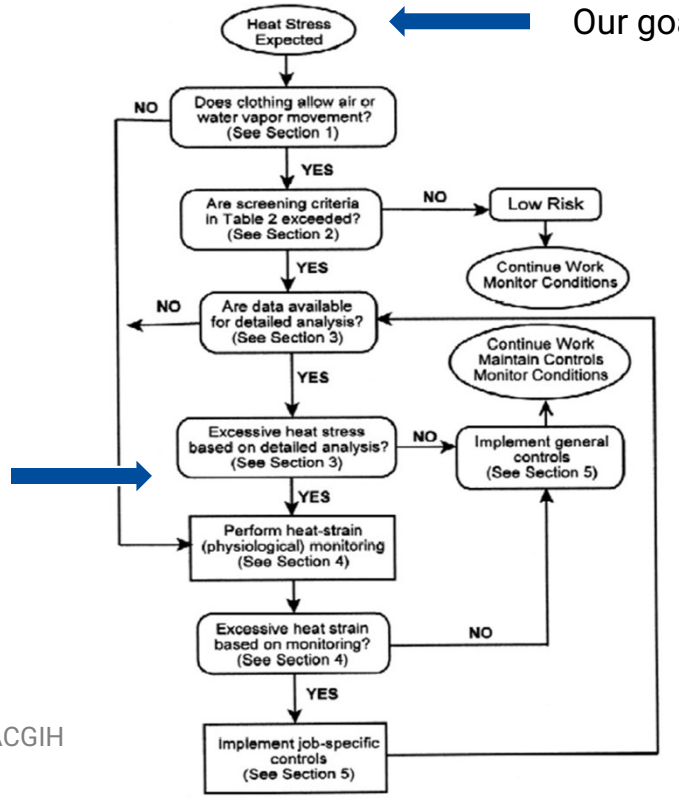
- Rest allows the body time to eliminate excess heat
- Blood flow diverted to the muscles can return to the skin
- ACGIH and NIOSH Guidelines

HEAT HAZARD ASSESSMENT

HEAT HAZARD ASSESSMENT

Our goal today

All paths lead here until you have data



Adapted from ACGIH

HEAT HAZARD ASSESSMENT (OTM, SEC III, CH 4)

1. Calculate WBGT using site-specific weather data
2. Add the Clothing Adjustment Factor to determine WBGT Effective
3. Determine the Metabolic Work Rate
4. Determine the Threshold Limit Value

Source: https://www.osha.gov/otm/section-3-health-hazards/chapter-4

STEP 1: WET BULB GLOBE TEMPERATURE (WBGT)

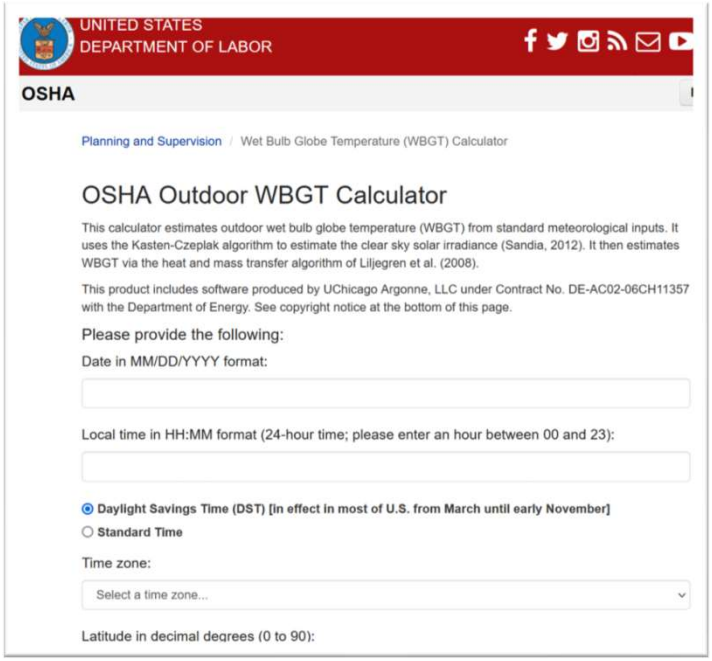
- Developed to assess heat stress during military training
- Integrated index using the following temperatures:
  - Dry bulb temp (T_{DB})
  - Natural wet bulb temp (T_{WB})
  - Globe temp (T_G)

Source: 3M/ Quest

ALTERNATIVE SOURCES FOR WBGT

- OSHA WBGT Calculator adapted from ANL to determine WBGT:
  - Air Temperature, °F or °C
  - Solar Irradiance, W/m2
  - Wind Speed, mph or m/s
  - Relative Humidity, %
  - Date and time
  - Barometric Pressure,
  - Longitude and latitude,

https://www.osha.gov/heat-exposure/wbgt-calculator

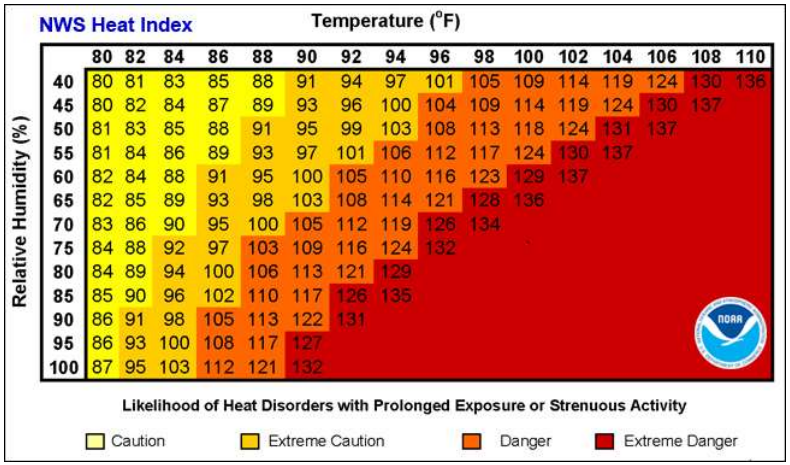


Source: OSHA

WET BULB GLOBE TEMPERATURE (WBGT)

Why don't we just use the Heat Index?

- Heat index only considers temperature and humidity
- It <u>does not</u> consider wind speed, radiant heat, clothing and metabolic heat from physical exertion, which are all factors that can contribute to heat stress



Source: NOAA

STEP 2: CLOTHING ADJUSTMENT FACTORS

As recommended by OSHA, the ACGIH Clothing Adjustment Factor (CAF) can be determined and added to the WBGT to produce an effective WBGT value*.

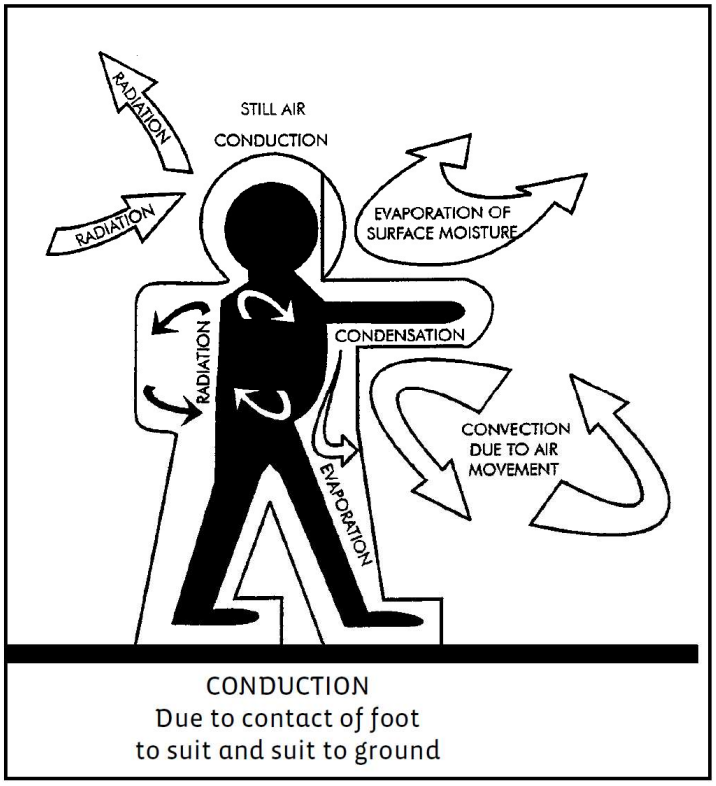
$$WBGT_{Eff} = WBGT + CAF$$

Clothing Worn	CAF (°F)
Work clothes (long sleeves and pants). E.g., standard cotton shirt/pants.	0
Coveralls (w/only underwear underneath). E.g., cotton or light polyester	0
Double-layer woven clothing.	5.4
SMS (spunbond/meltblown/spunbond) Polypropylene Coveralls	0.9
Polyolefin coveralls (no hood) (e.g. Tyvek)	1.8
Polyolefin coveralls (with hood) (e.g. Tyvek)	3.6
Firefighter turn-out gear	18.0
Limited-use vapor-barrier coveralls. Examples: whole- body chemical protective suites (e.g. Saranex)	19.8

Source: OSHA Technical Manual as adopted from ACGIH "2019 TLVs and BEIs" & converted to °F

* Cannot be used for multiple layer or encapsulating ensembles.

VISUALIZING ENCAPSULATING ENSEMBLES



- Heat from metabolic process
- Carried to skin via bloodflow (convection)
- From skin it may be radiated, evaporated, or conducted
- Evaporative cooling loss within ensemble

Source: AIHA – *The Occupational Environment*.

STEP 3: METABOLIC RATE (MR_{EST})

- ACGIH metabolic rates represent impact to the body core temperature
- Select a work category that best represents the workload using the provided guide
- If different activities are planned, use the heaviest workload to determine Mr_{est}

TABLE 3. Metabolic Rate Categories and the Representative Metabolic Rate with Example Activities

Category	Metabolic Rate [W] *	Examples
Rest	115	Sitting
Light	180	Sitting with light manual work with hands or hands and arms, and driving. Standing with some light arm work and occasional walking.
Moderate	300	Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling. Normal walking.
Heavy	415	Intense arm and trunk work, carrying, shoveling, manual sawing; pushing and pulling heavy loads; and walking at a fast pace.
Very Heavy	520	Very intense activity at fast to maximum pace.

* The effect of body weight on the estimated metabolic rate can be accounted for by multiplying the estimated rate by the ratio of actual body weight divided by 70 kg (154 lb).

Source: ACGIH "2019 TLVs and BEIs"

STEP 3: METABOLIC RATE (MR_{EST})

Using guidelines provided by ACGIH, the formula below was used to adjust estimated metabolic heat (MH) for body weight.

$$\mathbf{MR_{est}} = \frac{\boldsymbol{Metabolic\ heat\ (in\ Watts) \times Worker\ body\ weight\ (in\ lbs.)}}{\boldsymbol{154\ lbs.}}$$

Two acclimated workers (200 and 265 lbs, respectively) are performing walk-around housekeeping of a worksite. What is their adjusted Mr_{est}?

$$\mathbf{MR_{est}} = \frac{(300\ W)x(200\ lbs)}{154\ lbs}$$

$$\mathbf{MR_{est}} = 389\ \text{W}$$

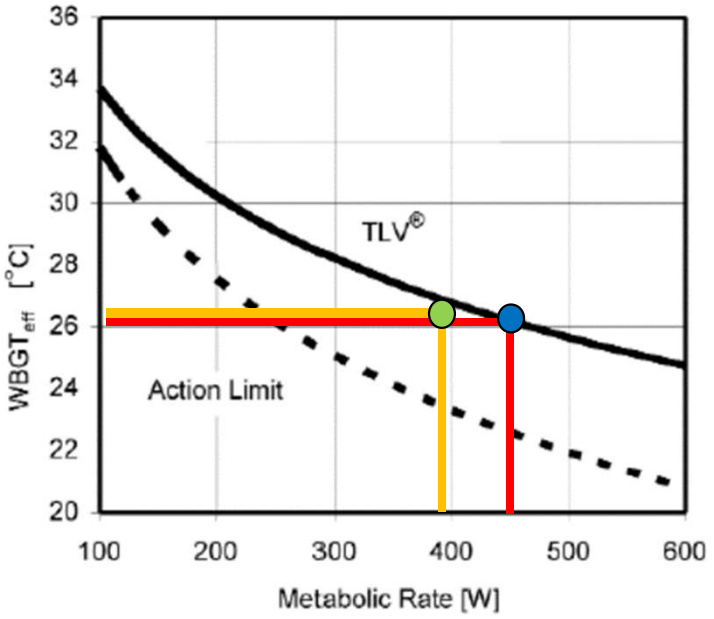
$$\mathbf{MR_{est}} = \frac{(300\ W)x(265\ lbs)}{154\ lbs}$$

$$\mathbf{MR_{est}} = 516\ \text{W}$$

STEP 4: DETERMINE THE TLV
(ACGIH EVALUATION CRITERIA)

- Screening criteria for TLV and AL are initial screening tools to evaluate whether a heat stress situation may exist based on acclimation, WBGT, workload and work/rest regimen.
- Once either limit is reached, controls are necessary to prevent heat-related illness.

Assuming the two employees from previous slide are working on a 79°F day (26°C)…



Source: ACGIH "2019 TLVs and BEIs"

EXAMPLE WORK/REST REGIMEN GUIDELINES
(ACCLIMATED WORKERS)

$WBGT_{eff}$ °F Temperature[1]	Work / Rest Period (minutes) [2,3] [Selection based on representative workload]				Prevention and Control Strategy [4]
	Light	Moderate	Heavy	Very Heavy	
> 86.0	60/0	**STOP**	**STOP**	**STOP**	Consult Safety Dept. prior to the start of work to discuss controls, proposed engineering and administrative controls, and physiological monitoring. Consider rescheduling activities.
86.0	60/0	30/30			
85.1	60/0	30/30			
84.2	60/0	45/15	30/30		
83.3	60/0	45/15	30/30	25/35	
82.4	60/0	60/0	45/15	30/30	Caution indicates high levels of heat stress possible; consider and providing additional engineering and administrative controls.
80.6	60/0	60/0	60/0	45/15	
78.8	60/0	60/0	60/0	45/15	
77.9	60/0	60/0	60/0	60/0	
77.0	60/0	60/0	60/0	60/0	Implement general controls such as shaded/cool rest areas and hydration.
76.1	60/0	60/0	60/0	60/0	
75.2	60/0	60/0	60/0	60/0	

Adapted from ACGIH TLVs and BEIs [2019]

1) $WBGT_{eff}$ must include a clothing adjustment factor.
2) Based on ACGIH Threshold Limit Value (TLV) for acclimatized workers screening criteria.
3) Recovery periods must occur in a cooler area where relief from heat stress can take place to be a 'rest cycle'.
4) Reassess work category, clothing/PPE and environmental conditions if any of these factors change from initial assessment. New control strategies shall be implemented as needed.

EXAMPLE WORK/REST REGIMEN GUIDELINES
(ACCLIMATED WORKERS WEARING CHEMICAL-RESISTANT SUITS)

Air Temp	Full Sun			Partly Cloudy			No Sun [1]		
	Light	Mod	Heavy	Light	Mod	Heavy	Light	Mod	Heavy
95°F	STOP [3]	STOP [3]	STOP [3]	STOP [3]	STOP [3]	STOP [3]	15/45	STOP [3]	STOP [3]
90°F	Caution [2]	Caution [2]	STOP [3]	20/40	Caution [2]	Caution [2]	40/20	Caution [2]	STOP [3]
85°F	15/45	10/50	Caution [2]	40/20	25/35	15/45	Normal	25/35	40/20
80°F	30/30	20/40	10/50	Normal	Normal	40/20	Normal	Normal	Normal
75°F	Normal	Normal	35/25	Normal	Normal	Normal	Normal	Normal	Normal

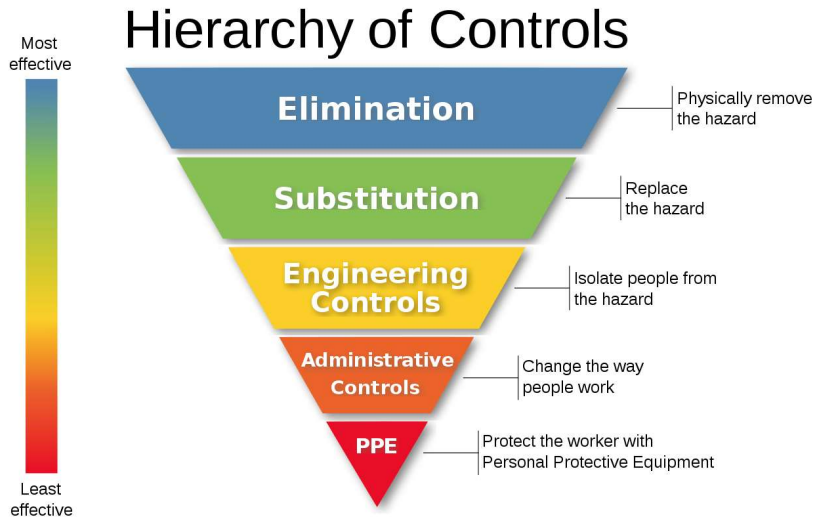
Adapted from EPA [1993]

1) No shadows are visible or work is in the shade, at night or indoors.
2) Caution indicates high levels of heat stress; consider rescheduling activities and providing additional controls.
3) Consult Safety Dept. if work is to proceed to verify the proposed engineering and administrative controls.

HEAT STRESS CONTROLS

HEAT STRESS CONTROL STRATEGIES

- Reduce heat exposure risk level
- Implement physiological monitoring
- Implement engineering controls
- Implement administrative / work practice controls
- Implement PPE & equipment controls



Source: NIOSH

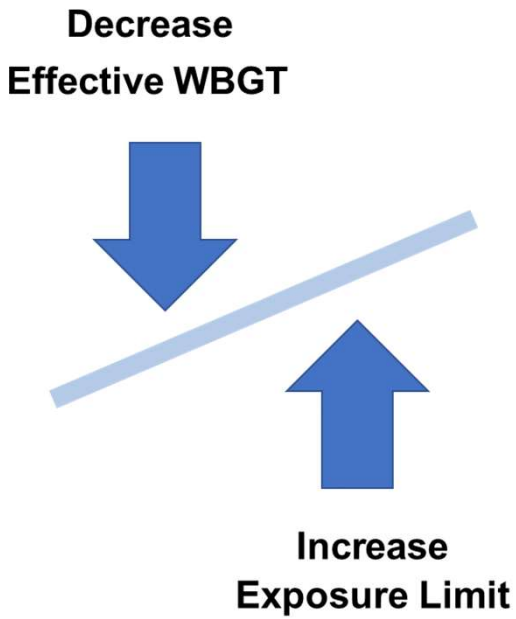
REDUCING HEAT RISK LEVEL

Effective WBGT

- Temperature and radiant heat
- Air velocity
- Humidity
- Clothing

Occupational Exposure

- Metabolic work rate
- Work-rest schedule



PHYSIOLOGICAL MONITORING

Allows removal of employees from hot environments before illness

Provides quantitative measures of each employee's response to heat strain

- Body temperature
- Heart rate

Additional measures to help reduce dehydration

- Urine color
- Body weight

Source: AIHA

PHYSIOLOGICAL MONITORING (CONT'D)

Body Temperature

- Deep body core temperature is single best measure of heat strain, but is … *difficult*… to measure
  - Wearable technology (non-invasive)
  - Wireless 'pill' devices
- Body core temperature
  - < 101.3°F for acclimated personnel
  - < 100.4°F unacclimated personnel
- Oral temperature has been used as an acceptable substitute
- Axillary (armpit) also acceptable and used clinically

Recovery Heart Rate

- Pulse rate is good indicator of body temperature and heat stress
- Simple to obtain
- Take pulse rate at beginning of rest break (P1), and if pulse is above 100 bpm, then measure at 2-minute intervals.
- If resting pulse is > 100 bpm after 10 minutes, seek medical attention

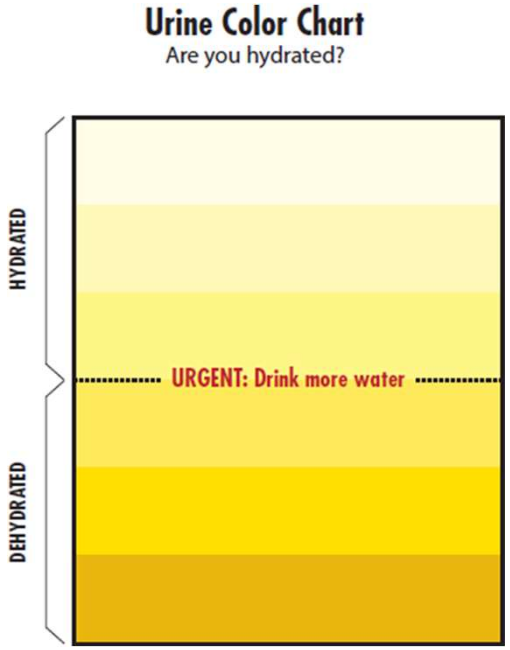
PHYSIOLOGICAL MONITORING (CONT'D)

Urine color monitoring

- Urine color as qualitative indicator of potential dehydration
  - **Not** good indicator of heat stress
- Normal urine should be pale yellow
- Darker urine can indicate dehydration
- Some diets, medications and illnesses may affect results

Body Weight Monitoring

- Weight loss over a shift > 1.5% body weight



Source: NIOSH

ENGINEERING CONTROLS

- Establish cooling areas
- Lower air temperature below skin temperature
  - Increasing air velocity
- Lower humidity to increase evaporative cooling
- Evaporative cooling (misters, swamp coolers) in low humidity environments
- Shielding from radiant heat

Source: Big Ass Fans

WORK PRACTICE CONTROLS
HYDRATION

Table 27.4 — Fluid Replacement Guidelines

- Workers should be careful to consume a well-balanced diet and drink plenty of nonalcoholic beverages in the day preceding severe heat exposure.
- Workers should avoid diuretic drinks immediately prior to work and drink as much as a half liter prior to commencement of work.
- During work, workers should try to drink as much and as frequently as possible.
- Workers should be provided cool drinks that appeal to them. Fluids can contain 40–80 g/L of sugar and 0.5 to 0.7 g/L of sodium.
- Workers should be encouraged to drink as much as possible and consume foods rich in electrolytes between work shifts and during breaks.
- Body weight should be monitored at the start and end of each shift to ensure that progressive dehydration is not occurring.

Note: These guidelines were adapted, in part, from McArdle, et al.[18]

Source: AIHA *The Occupational Environment*

Source: Cal/OSHA

WORK PRACTICE CONTROLS
REST BREAKS, SHADE, AND SCHEDULING

Rest Breaks

- Allows blood to flow to skin to be cooled
- Slows down the buildup of heat in the body from prolonged muscle activity
- Allows heart rate to recover from sustained heat stress and physical exertion

Shade

- Blocks radiant heat source, provides rest area

Scheduling

- Modified work schedules (duration and time of day)

Source: Safety Hubb

WORK PRACTICE CONTROLS
HEAT ILLNESS PREVENTION PROGRAM

Consideration of the following:

- Monitoring of weather conditions
- Determination of exertion levels
- Access to unlimited water and shaded areas
- Scheduled rest breaks
- Acclimatization methods and procedures
- Work practice / administrative controls
- Emergency procedures
- Training for employees and supervisors
- Employee access to the program / site plan

OSHA Sample Heat Illness Prevention Plan: https://www.osha.gov/sites/default/files/2021-07/Model%20Heat%20Illness%20Prevention%20Plan.pdf

PERSONAL PROTECTIVE EQUIPMENT

- Lighter, breathable clothing
- Reflective clothing, radiant barriers
- Infrared reflecting face shields
- Cooling neck wraps
- Air cooled suits / respirators
- [Evaporative] Cooling vests

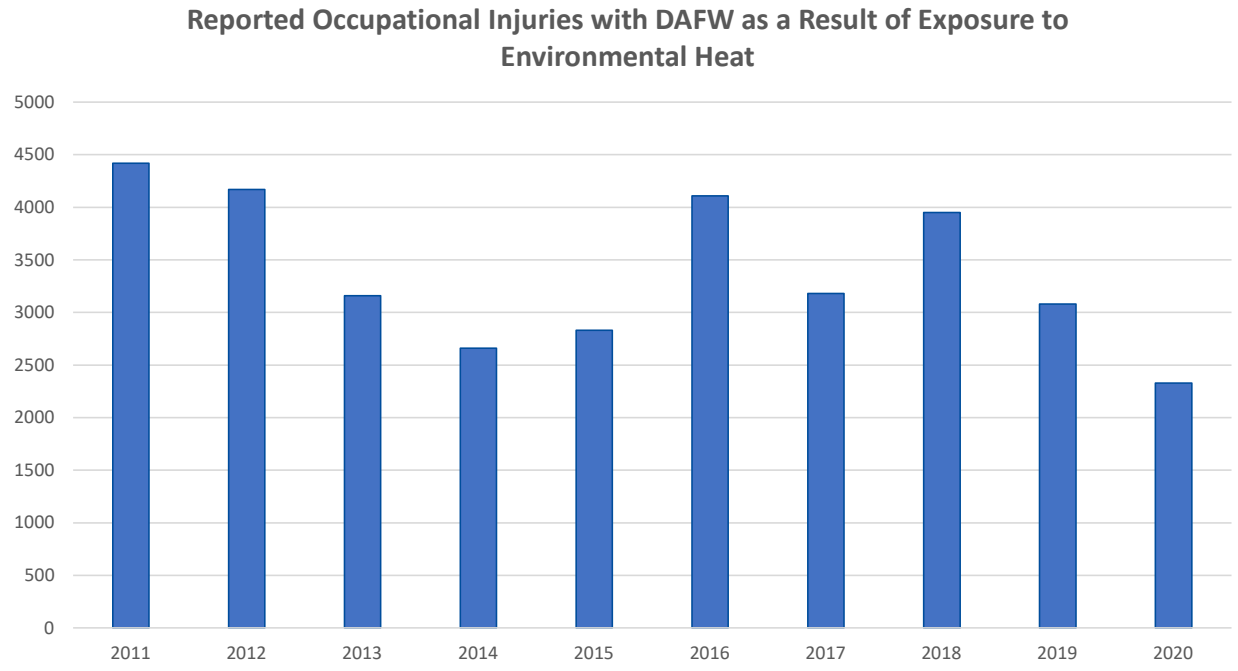
Source: Ergodyne

HEAT CONTROL MATRIX

Factor	Effective Solution
Temperature	Reschedule work for cooler times of the day
	Reschedule heavy physical exertion (avoid strenuous work between 2-4PM)
	Shift location of work activities
Air Velocity	Increase air velocity using fans, when air temperatures and humidity are low
	Shield against / decrease air velocity when air temperature significantly above skin temperature
Humidity	Control and lower humidity to increase evaporative cooling
	Use local exhaust ventilation to capture and control humidity sources
	Schedule strenuous work during periods of lower humidity
Radiant Heat	Provide shade and cooling areas
	Provide radiant barriers between sources and workers (insulation)
	Lighter color, breathable, cooling or radiant barrier clothing
Metabolic Heat	Use power tools to lessen physical exertion
	Adjust work-rest schedule
	Worker selection

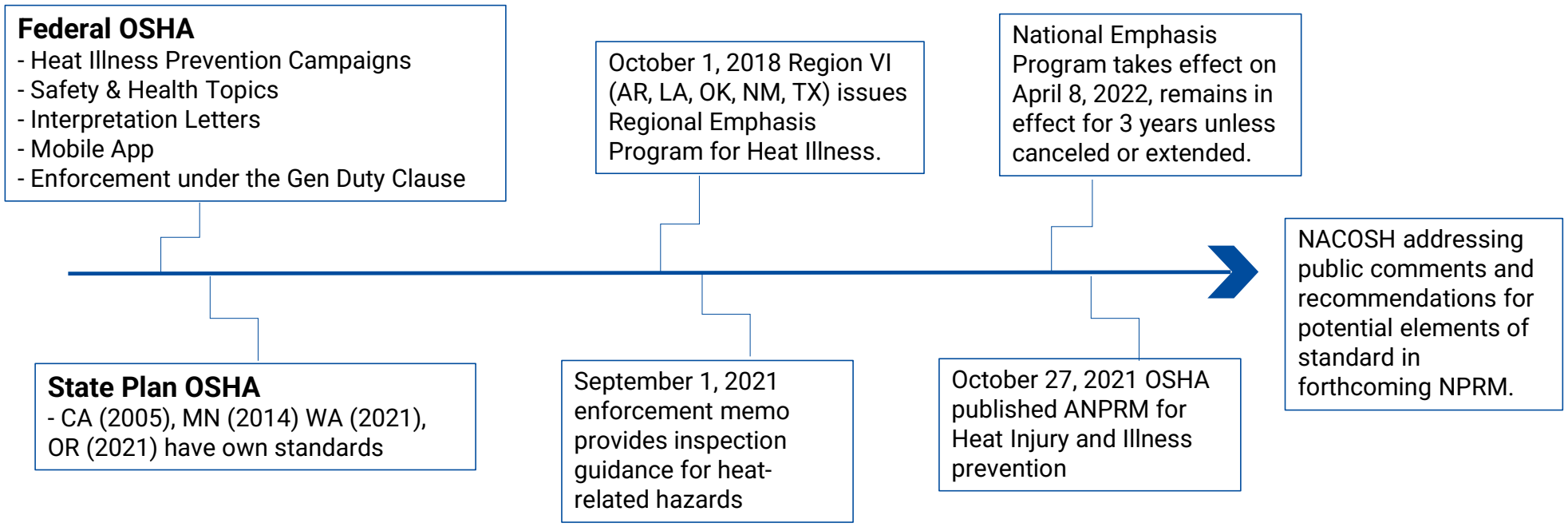
OSHA HEAT INITIATIVES

HEAT-RELATED ILLNESS DATA



Source: US Bureau of Labor Statistics: Injuries, Illnesses and Fatalities (Accessed March 7, 2023)

OSHA HEAT INITIATIVES – PAST AND PRESENT



STATE PLAN RULES - OVERVIEW

TABLE II.D.1—STATE RULES ON HAZARDOUS HEAT AS OF AUGUST 2021

Standard requirements	CA *	MN **	OR ***	WA **** (*emergency rule additions in italics*)
Worksite coverage	Outdoor, year-round	Indoor, year-round	Indoor and outdoor, emergency rule.	Outdoor, May 1–Sept. 30.
Thresholds triggering protection requirements.	80 °F (ambient temp.)	Between 77 °F–86 °F (WBGT) based on workload.	80 °F (NOAA NWS Heat Index).	89 °F (ambient temp.); lower if wearing heavy clothing/PPE.
Add'l high heat protections	At 95 °F (certain industries only).	No	At 90 °F	*At 100 °F.*
Water/Hydration	1 qt./hr./worker	No	1 qt./hr./worker, cool or cold.	1 qt./hr./worker *Suitably cool.*
Shade	Yes	N/A	Yes	*Yes.*
Training	Yes (new hire)	Yes (new hire and annual)	Yes	Yes (new hire and annual).
Breaks	Yes (Encouraged generally, mandatory if symptoms).	Yes (After two hours exposure at threshold).	Yes (Mandatory if symptoms at any temp. every 2 hours for all at 90 °F).	Yes. (*Encouraged preventative and must be paid;* Mandatory if symptoms; Mandatory at 100 °F).
Acclimatization Plan	Yes	No	Yes (in practice at 90 °F)	No (only included in training).
Heat Illness Prevention Plan.	Yes	No	No	Yes (as part of accident prevention plan).
Emergency Medical Response Plan.	Yes	No	Yes	Yes.
Medical Monitoring	Reactive, Proactive when above 95 °F.	Reactive	Reactive	Reactive.
Record-keeping requirements.	Yes	Yes	No	Yes.

Source: Federal Register / Vol. 86, No. 205, 2021 – ANPRM Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings

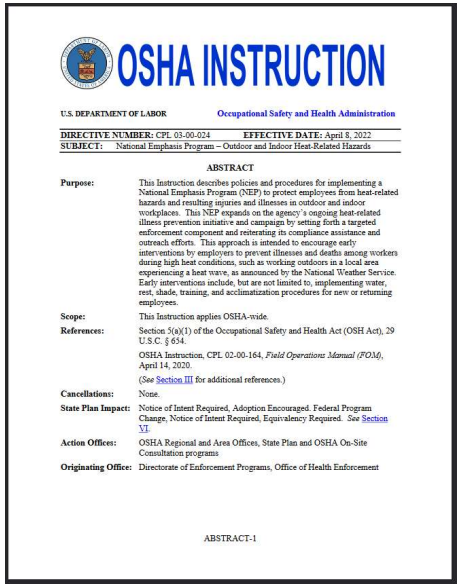
STATE PLAN RULES – OVERVIEW
MORE INFORMATION AND UPDATES

State Plan regulations in CA, MN, OR and WA

- CAL/OSHA, Title 8, section 3395. Heat Illness Prevention.
  - https://www.dir.ca.gov/Title8/3395.html
- Minnesota Administrative Rules. Section 5205.0110 Indoor ventilation and temperature in places of employment.
  - https://www.revisor.mn.gov/rules/5205.0110/
- Oregon Administrative Rules. 437-002-0156 Heat Illness Prevention
  - https://osha.oregon.gov/OSHARules/adopted/2022/ao3-2022-text-alh-heat.pdf
- Washington Administrative Code (WAC) Title 296, General Occupational Health Standards. Sections 296-62-095—296-62-0 9560.
  - Outdoor Heat Exposure
    - https://app.leg.wa.gov/WAC/default.aspx?cite=296-62&full=true#296-62-095
  - Emergency Rule 2125 CR103E. (Re-adopted 6/1/22)
    - https://lni.wa.gov/rulemaking-activity/AO22-22/2222CR103EAdoption.pdf

OSHA NEP—OUTDOOR AND INDOOR HEAT RELATED HAZARDS
INSPECTION GUIDANCE

- Applies to indoor and outdoor worksites where “potential heat-related hazards exist”
- Allows OSHA to initiate heat-related assessments at NWS caution level on *heat priority days*
- Prioritizes inspections on days when heat index exceeds 80°F
  - (1) Heat-related complaints and referrals of heat related illness
  - (2) CSHO will either conduct intervention or open inspection
  - (3) Expand scope of other inspections to address heat-related hazards
- Outlines process for inspections
  - Field Operations Manual CPL 02-00-164
  - OSHA Technical Manual, Section III, Chapter 4 – Heat Stress



OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR — Occupational Safety and Health Administration

DIRECTIVE NUMBER: CPL 03-00-024 **EFFECTIVE DATE:** April 8, 2022
SUBJECT: National Emphasis Program – Outdoor and Indoor Heat-Related Hazards

ABSTRACT

Purpose: This Instruction describes policies and procedures for implementing a National Emphasis Program (NEP) to protect employees from heat-related hazards and resulting injuries and illnesses in outdoor and indoor workplaces. This NEP expands on the agency's ongoing heat-related illness prevention initiative and campaign by setting forth a targeted enforcement component and reiterating its compliance assistance and outreach efforts. This approach is intended to encourage early interventions by employers to prevent illnesses and deaths among workers during high heat conditions, such as working outdoors in a local area experiencing a heat wave, as announced by the National Weather Service. Early interventions include, but are not limited to, implementing water, rest, shade, training, and acclimatization procedures for new or returning employees.

Scope: This Instruction applies OSHA-wide.

References: Section 5(a)(1) of the Occupational Safety and Health Act (OSH Act), 29 U.S.C. § 654.

OSHA Instruction, CPL 02-00-164, *Field Operations Manual (FOM)*, April 14, 2020.

(See Section III for additional references.)

Cancellations: None.

State Plan Impact: Notice of Intent Required, Adoption Encouraged. Federal Program Change, Notice of Intent Required, Equivalency Required. See Section VI.

Action Offices: OSHA Regional and Area Offices, State Plan and OSHA On-Site Consultation programs

Originating Office: Directorate of Enforcement Programs, Office of Health Enforcement

ABSTRACT-1

https://www.osha.gov/sites/default/files/enforcement/directives/CPL_03-00-024.pdf

OSHA NEP—OUTDOOR AND INDOOR HEAT RELATED HAZARDS
INSPECTION GUIDANCE (CONT'D)

During heat-related inspections, CSHOs will:

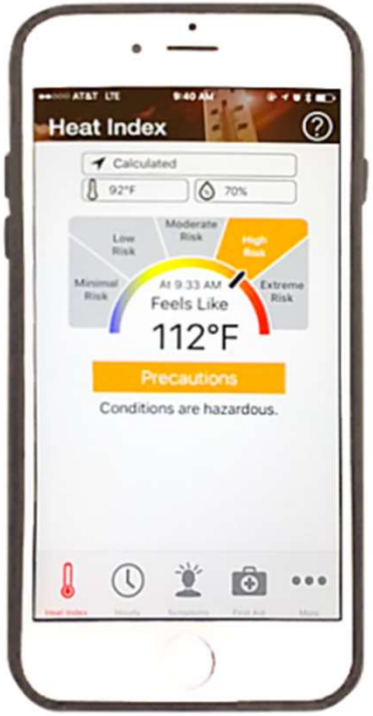
- Review OSHA 300 Logs for any entries indicating heat-related illness(es)
- Interview workers for reports of symptoms of heat-related illnesses
- Review the employer's heat stress plans including acclimatization procedures, work-rest schedules, access to shade and water, and training records
- Identify conditions and activities relevant to heat-related hazards including:
  - Sources of heat exposure
  - WBGT calculations
  - Heat advisories
  - Clothing, PPE and equipment
  - Vacations / gaps in employment
  - Employee activities
  - Metabolic heat rates
  - Duration of exposure
  - Water / shade availability
  - Heat illness among SSE

OSHA-NIOSH HEAT SAFETY APP

- Indicator of the current heat index
- Associated risk levels specific to your current
- Precautionary recommendations specific to risk levels from NIOSH
- Editable location, temperature, and humidity controls for calculation of variable conditions
- Signs and symptoms and first aid information for heat-related illnesses

** Relative to nearest weather station

https://www.cdc.gov/niosh/topics/heatstress/heatapp.html



DRINKING FROM A FIREHOSE?

Keep it Simple.

- Anticipate and recognize when heat stress conditions are expected.
- Lots of tools available for estimating environmental heat conditions
- Use an objective basis for evaluating potential heat stress conditions.
- Plan the work, work the plan.

ASRC INDUSTRIAL

Unified by Purpose

Biographical Information

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Mike has the privilege of serving as the Vice President of HSE for ASRC Industrial Services, a native Alaskan corporation of 4,500 employees providing industrial, environmental, multi-craft and engineered services to federal and private client nationwide. Mike endeavors to provide practical applications of HSE knowledge to further worker health and safety in complex environments and believes this is some of most rewarding work he's had the pleasure of performing.